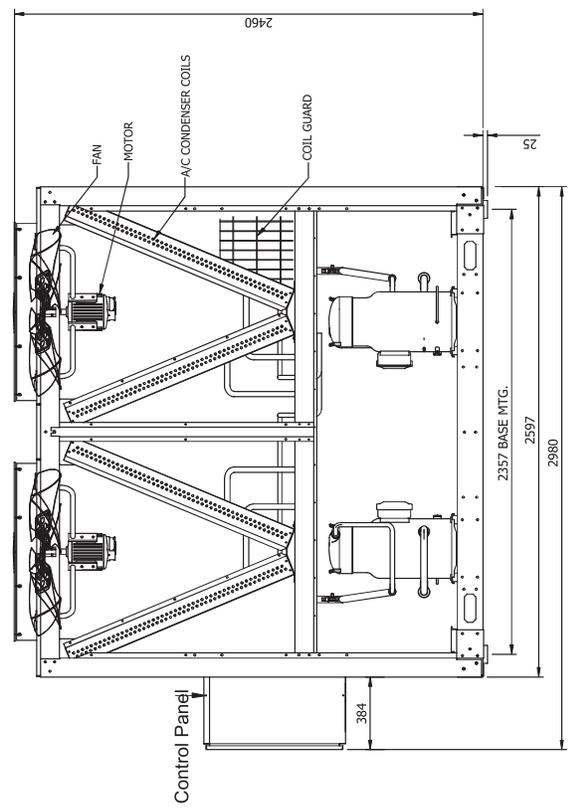
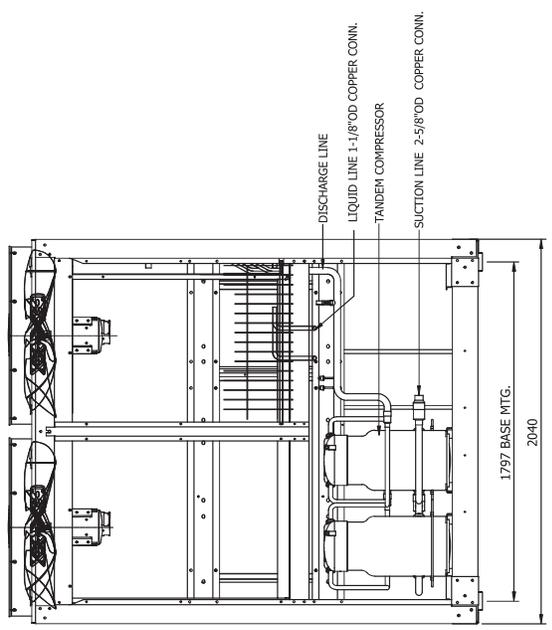
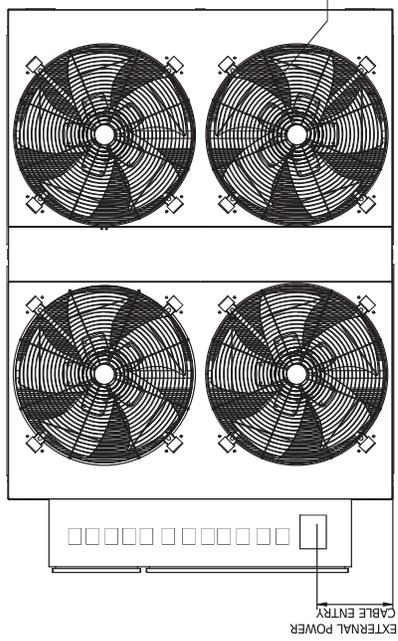


Customer	NTPC	Job No.	M22/DEL-015.BHEL
Project	3x200+4x500 MW NTPC KORBA TPPFGD	Date	19.12.2022
BHEL Doc. No.	PE-V0-466-(571-13000-A)-A209		2100-109-PVM-Y-003A

Sr.No.	Description	Details
1	Item	Air Cooled Condensing Unit
2	Model	ACUY2S-070ER2
3	Qty / Make	(3w + 3S) / BSL
4	Nominal Capacity-TR @ 7 °C evaporating and 35°C condenser air-over temperature.	66.5
5	Nominal Capacity- KW	233.8
6	Actual Capacity at@ 45 °C ambient in TR (Indoor- 24-°C and 50% RH)	55.9
7	Refrigerant	R407
8	Refrigerant Quantity	16 kg (approx) from Factory rest need to charge at site as per product manual guide as per site connected evaporating units.
9	Design ambient temp at 100% load- °C	45 °C
10	Operating Voltage- Volts	415 V +/- 10%
11	Operating Frequency-Hz	50 Hz +/- 5%
12	Control Voltage	230 VAC
13	Noise Level (1m distance)	81dB+/- 2dB
15	COMPRESSOR	
15.1	Make	Danfoss
15.2	Model	Proprietary data (Will depend on the availability of compressor)
15.3	Type	Hermetic Scroll
15.4	Qty	4
15.5	RPM	2900
15.6	Unit capacity reduction steps in %- Automatic	100/75/50/25
15.7	Oil type	POE type
15.8	Oil charge / compressor	210.57oz (approx)
16	CONDENSER	
16.1	Model	Air Cooled heat exchanger
16.2	Fan	4
16.3	Fan type	Totally Enclosed, Pad mounted Axial Flow Type
16.4	Total Fan CFM	58000
16.5	Total Fan Motor- kW	7.6
16.6	Each Fan Motor - kW	1.9
16.6	No. of Condenser Fan Motor	4
16.7	Tube diameter (OD)	3/8"

16.8	Tube thickness	Condenser Coil Thickness is 0.27mm
16.9	Tube Material	COPPER
16.10	Fin material	ALUMINIUM
16.13	No. of Fins per inch	13
16.14	Rows Deep	3
17	UNIT DIMENSION & WEIGHTS	
17.1	Length (mm)	2980
17.2	Width (mm)	2040
17.3	Height (mm)	2492
17.4	Operating Weight (Kg)	2100
17.5	Vibration Isolator (MOC)	Neoprene rubber cushy foot type with isolation efficiency not less than 85%
17.6	Refrigerant charge qty (Kg)	16 kg (approx) from Factory rest need to charge at site as per product manual guide as per site connected evaporating units.
17.8	Painting	Blue Star Standard
18	ADDITIONAL DATA	
18.1	Capacity of Unit in TR at 35 C	66.5
18.2	Total Power input (inc Fan) IN KW at 35 C	79.3
18.4	Motor KW of each Compressor (at Nominal Capacity)	58.4
18.5	IKW/TR for Compressor at actual including Fan	1.192
18.6	Design Ambient temp for Summer, Winter & Monsoon	Ambient of 45 °C has been considered which will be the highest temperature in summer and winter, monsoon temperatures will not exceed this
18.7	Specify Operating Evaporating Temperature	7 Deg C
18.8	COP of units based upon AHRI Condition	2.95 with Fan
18.9	Vibration Levels of units	Less than 1500 microns
18.10	Degree of Superheat in the evaporator	6 C
18.11	Recommended expansion valve model	(Make: Danfoss)
18.12	Inspection And Testing	As per Approved QAP
19	ACCESSORIES	REMARK
19.1	Suction & discharge stop valves	NR
19.2	Muffler	NR
19.3	Crank case heaters	Yes Available
19.4	Oil filters	NR
19.5	Temperature indicators for lube oil/heaters	NR
19.6	Oil level indicators	NR (Sight glass available on compressor)
19.7	Safety thermostat for crank case heater	NR
19.8	Pressure Gauge at each Stage	NR
19.9	Magnetic Oil Separator	NR
19.10	High/Low Pressure Cut outs	Yes Available
19.11	Oil Pressure Switches	NR
19.12	Relief Valve	Yes Available

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETER.

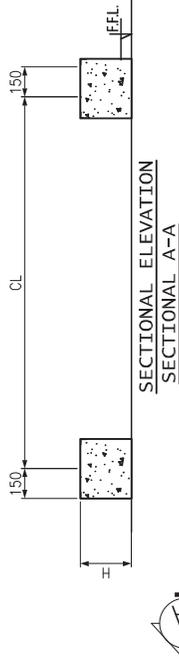


RECOMMENDED CLEARANCES TO PREVENT CONDENSER AIR RECIRCULATION AND FAULTY OPERATION OF UNITS ARE AS FOLLOWS:
 SIDE TO WALL 8'-0"
 REAR TO WALL 8'-0"
 CONTROL END TO WALL 5'-0"
 TOP 50'-0"
 DISTANCE BETWEEN ADJACENT UNITS 12'-0"
 NO MORE THAN ONE WALL CAN BE HIGHER THAN THE TOP OF THE UNIT
 UNIT REFRIG. CONNECTIONS: SWEAT BRAZED TYPE

REV.	CLASSIFIED	ISSUED FOR APPROVAL	DATE	DESCRIPTION	BY	CHK.	APP'D.

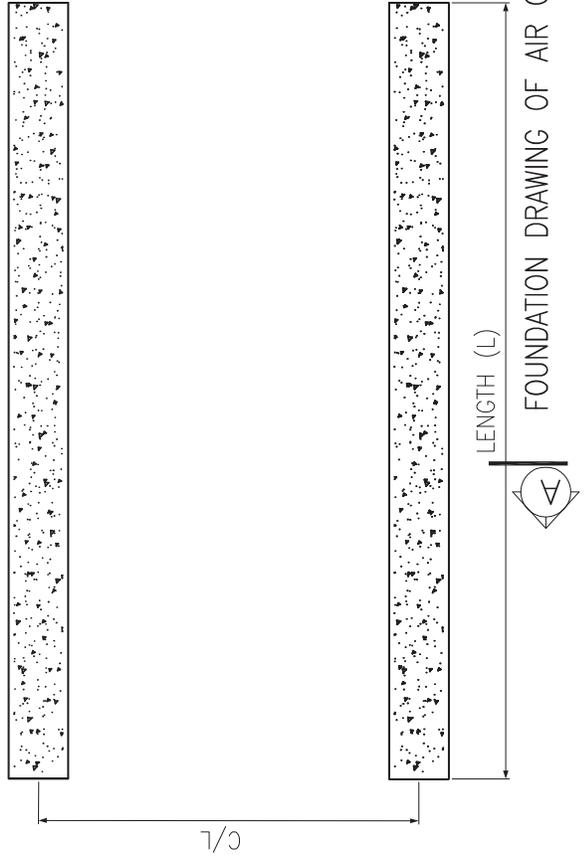
PROJECT TITLE:	3X200+3550+1450+MM VTC CUSTOM TPA-6CD
SUB-CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD
CUSTOMER:	NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)

PACKAGE / ITEM NAME/REV. PACKAGE	IS. No.	0000000000000000
NO. No.	0000000000000000	
DRAWING TITLE	TECHNICAL DATA SHEET & C.A DRAWING OF A/C-UNIT	
	CONSISTING OF THE FOLLOWING SHEETS:	
REF. DRAWING No.:	PECV0000000000000000	
NTPC DRAWING No.:	2100-100-0000-0000	
SCALE:	1:100	
SHEET:	1 OF 1	
REV.		
NO.		



FOUDATION DETAILS

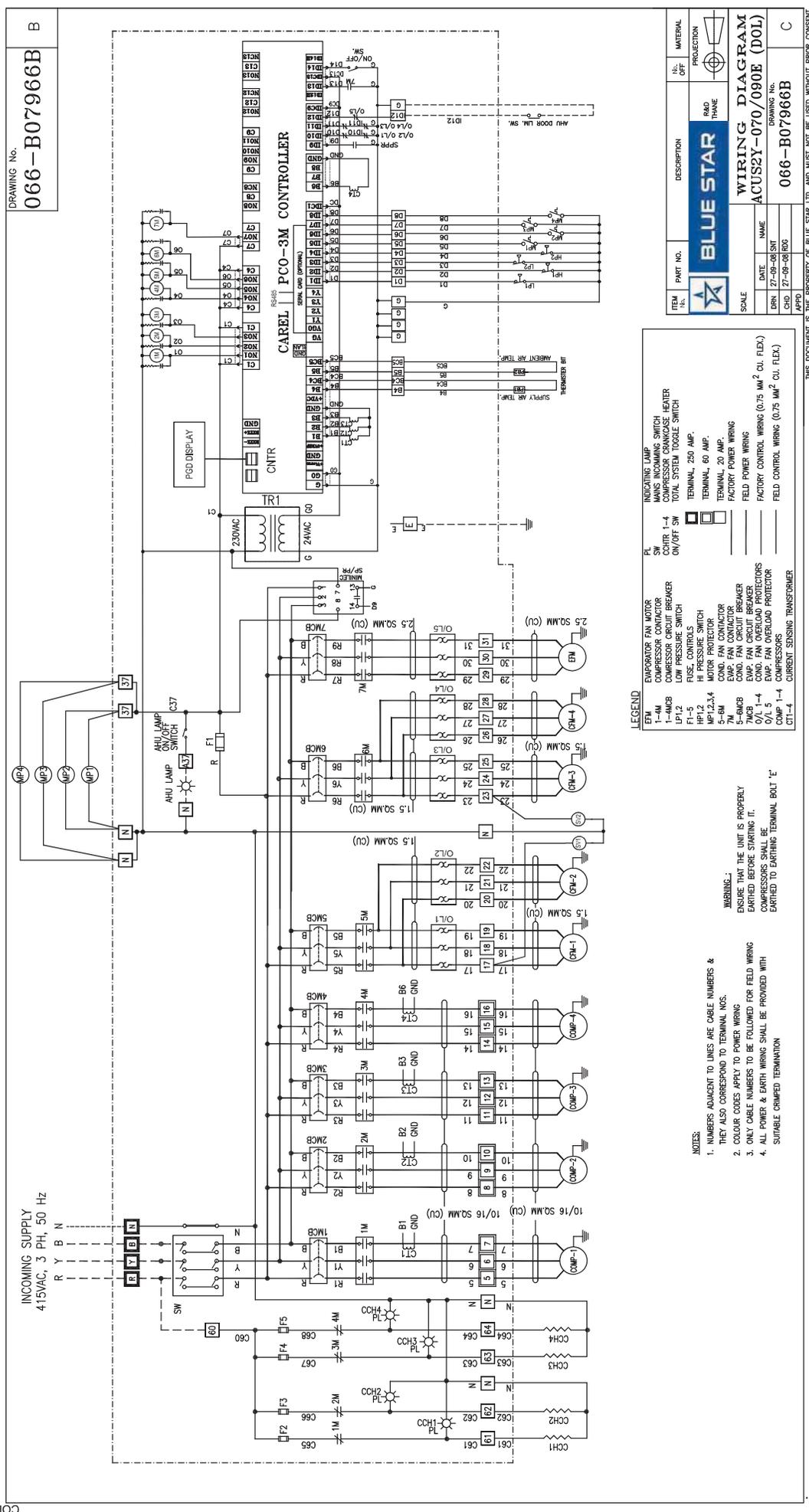
SR.NO	MODEL NO.	LENGTH (L)MM	WIDTH (CL)MM	HEIGHT (H)MM
1	ACUS3-042MR2	3460	1147	300
2	AGUS2Y-052ER2	2460	1797	300
3	ACUS2Y-070ER2	2460	1797	300



SCALE/NTS		ALL DIMENSIONS IN MM UNLESS OTHERWISE SPECIFIED			
		BLUE STAR		FOUNDATION DETAILS OF AIR COOLED CONDENSING UNIT	
DATE	NAME	DRN	SSK	DRAWING No	SHEET
25.08.18	SSK	25.08.18	SSK	---	0
CHKD	SSK	25.08.18	SSK		
APPD	SSK	25.08.18	SSK		
REV	DATE	ENGINEERING CHANGE	C.NNo.	DRN	CHKD
0	06-09-13	DRAWING REDRAWN TO N.T.S	0	SSK	RDG

ELECTRICAL WIRING DIAGRAM - ACUS2Y - 070E / 090E / ER2

CONDENSING UNIT



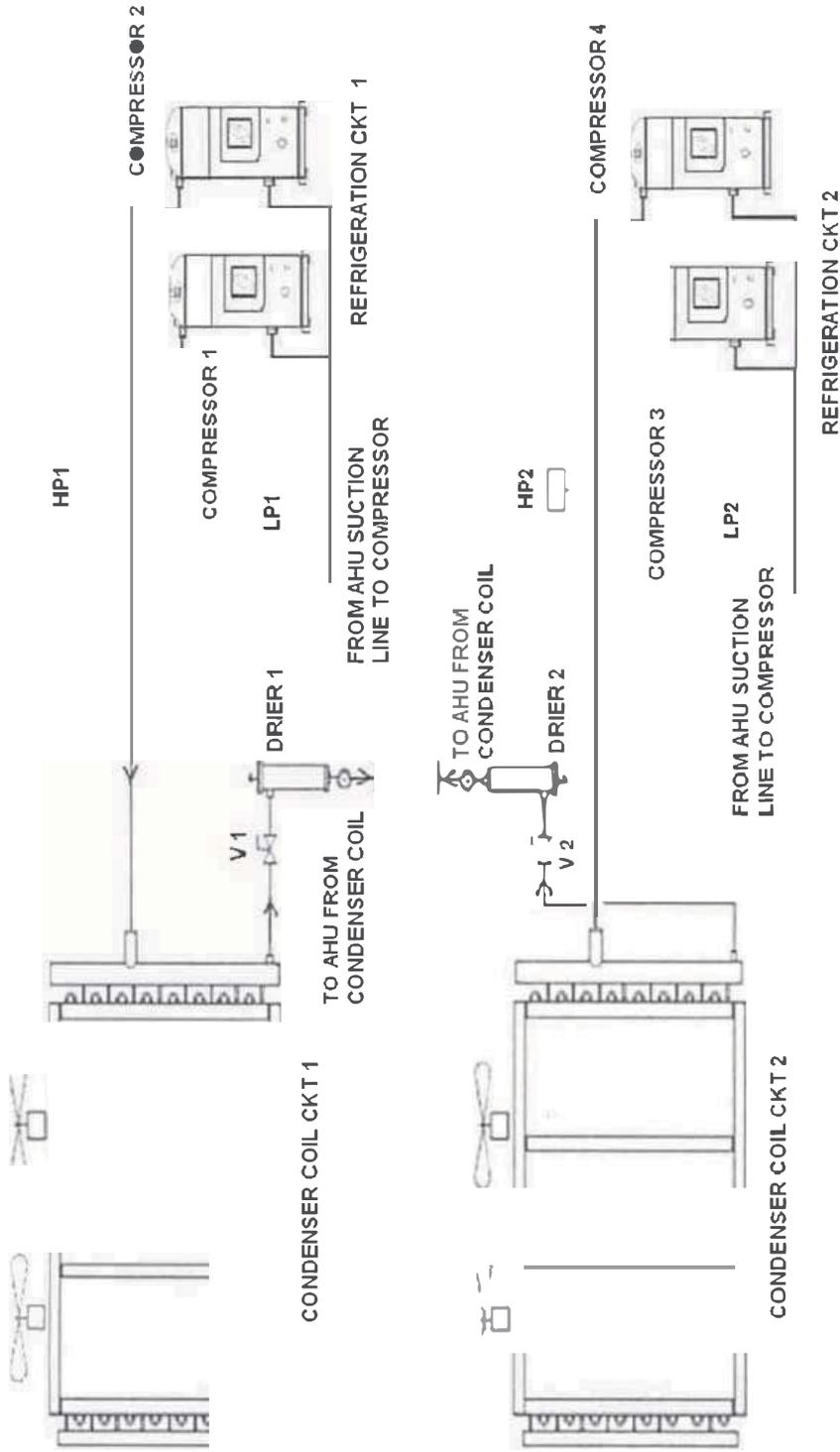
BLUE STAR

WIRING DIAGRAM
ACUS2Y-070/090E (D01)

SCALE: _____
DATE: _____
DRAWING No: 066-B07966B
APPD: _____

ITEM NO. _____
PART NO. _____
DESCRIPTION: _____
MATERIAL: _____
PROJECTION: _____

P & I Diagram - ACUY2S-052ER2/070ER2



Sr No	Component
2	Fan & Motor
4	Isolation Valve
6	Sight Glass
7	High Pressure Switch
	Low Pressure Switch

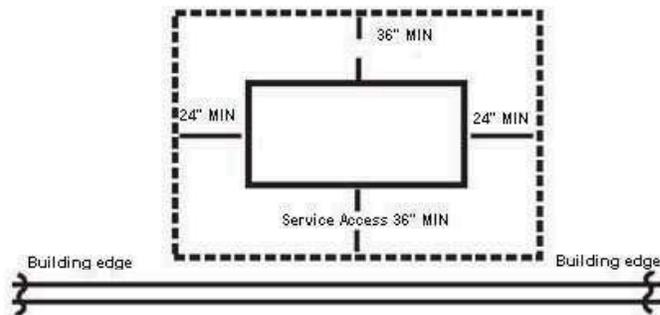
ABOVE CKT IS FOR ONE CONDENSING UNIT



General Installations

The condensing unit should be installed outdoors. It should be located as near as possible to the evaporator section to keep connecting refrigerant tubing lengths to a minimum. The unit must be installed to allow a free to the condenser coils.

If several units are installed adjacent to each other, care must be taken to avoid recirculation of air from one condenser to another. In all installations, adequate space must be provided for installation and servicing.



The unit must not be connected to any duct work. Do not locate unit under a roof drip; if necessary, install gutters, etc. to prevent water run-off from hitting the unit. To prevent air recirculation, it is recommended that the unit not be installed under an overhang, but if necessary allow a minimum of 60 inches above the unit for air discharge.

Rooftop Installation:

If rooftop installation is required, make certain that the building construction is adequate for the weight of the unit. (Refer to physical data chart) Before placing the unit on the roof, make certain that the nylon rigging slings are of sufficient length to maintain equilibrium of the unit when lifting. Under no circumstances should the unit be lifted by only one corner for rooftop installation.

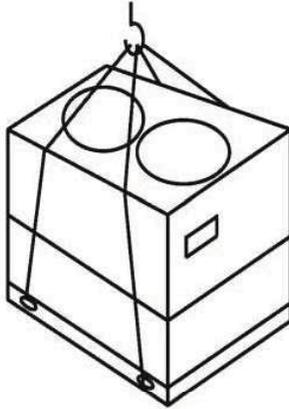
Installation:

Proper care should be taken to make the foundation for the chiller. Study the GA drawings of respective models and arrange for wider foundation as required to accommodate all the isolators within the width of foundation. In case the chiller is located on the roof top, ensure that the same is located in such a way that the load of the same is transferred to the columns and not to the slab directly. The foundation should be properly leveled.

Rigging: The rigging of the unit to be done with flat nylon ropes. Use hooks of the ropes in the slots provided in the base. Rig at a single point using four ropes. While rigging the units panels should be in position. See figure below for rigging.

If overhead lifting is not possible, place the chiller on a skid or pad for rolling or dragging. While rolling, use minimum of 3 rollers. When dragging, the unit should be dragged by applying force to the pad. Applying force on the unit should be avoided. When in final position, raise the unit to lift from pad.

Caution : All the panels should be in place while rigging.



Before proceeding with installation, refer to installation instructions packaged with each model, as well as complying with all Federal, State, Provincial and local codes, regulations and practices.

Wiring

Note: Field wiring must comply with the National Electric Code and any local ordinance that may apply.

Electrical Wiring:

It is important that proper electrical power is available at the unit. Voltage must not vary more than 10% of the rated voltage. Inter phase voltage variation on three phase unit must not be more than 3%. Contact local power company for correction of improper voltage or phase unbalance.

Wire Routing:

Power wiring must run in conduit. Conduit must be run through the connector panel below the service cover and attached to the bottom of the control box.

Grounding:

WARNING : The unit must be permanently grounded.

A grounding lug is provided in control box for a ground wire. Grounding may be accomplished by grounding the power line conduit to the unit.

WARNING

After completion of wiring check all electrical connections, including factory wiring within the unit, and make sure all connections are tight, replace and secure all electrical box covers and access doors before leaving unit or turning on power to circuit supply unit.

Leak Testing

Pressurize line set and coil through fitting with dry nitrogen. Leak test all joints using liquid detergent. If leaks are found, recover pressure and repair.

Evacuation and Charging

The evacuation of any system component that has been exposed to atmosphere or lost its charge is essential before charging. Never attempt to operate a system while it is under a vacuum.

NOTE: the unit shipped with a holding charge of dry nitrogen/refrigerant which must be purged from the unit before evacuation.

- a) Since the outdoor unit itself must be evacuated, open the liquid and optional vapour shut-off valve.

- b) Use a refrigerant type vacuum pump capable of evacuation in the 500 micron range.
- c) Connect the vacuum pump to the service manifold assembly with a pressure gauge that will read 30 inches vacuum. Connect the service manifold to the suction valve port.
- d) With an accurate scale, 1/2 oz., set refrigerant tank up so its weight can be measured while in a positions to charge liquid (unit must be off).
- e) Connect to the liquid line service port. Shut off tank and evacuate the system. The pressure gauges should read at least 29.5” of vacuum.
- f) Triple evacuate the system.
- g) The refrigerant system will now be free of non-condensable.
- h) Remove vacuum pump from 3-way valve.
- i) Install refrigerant tank (liquid charging) to liquid service valve.
- j) Note weight of refrigerant tank.
- k) Open refrigerant tank valve. Allow pressure in tank and unit to equalize.
- l) Close service ports on liquid line and note weight of refrigerant tank.
- m) Position tank for gas charging.
- n) Close main disconnect switch and charge refrigerant through vapor line service ports until the moisture indicating sight glass is clear.
- o) Note weight of refrigerant tank.
- p) When system has stabilized, check the superheat at the vapor line service valve. The actual line temperature should be 15 to 25 Deg F higher the saturation temperature corresponding to the suction pressure. If superheat is measured at evaporator, the actual line temperature should be 15 to 20 Deg F higher than saturation temperature corresponding to the suction pressure.
- q) Close service ports on vapor lines. Remove service gauges.
- r) Replace service port caps and valve stem caps. These caps must be replaced to prevent leaks.

Charging Hints :

Symptom	Possible Cause	Remedy
High head pressure	Air flow to/from condenser restricted or dirty condenser	Remove obstruction, relocate condensing unit, if necessary clean condenser
	Faulty condenser fan or motor	Replace
	Overcharge of refrigerant	Reduce charge
	Air in system	Evacuate and recharge
Low head pressure	Short of refrigerant	Check for leak, add charge
	Low evaporator air flow	Increase blower speed, check filters
Low vapor & hot compressor	Short of refrigerant	Check for leak—add refrigerant
Excessive sweating	Low indoor airflow	Increase speed of air handler blower or reduce restriction, replace air filter
	Excess refrigerant	Slowly reduce charge

Final Leak Testing

After the unit has been evacuated and charged, halogen leak detector should be used to detect leaks in the system. If a leak is detected, the refrigerant should be recovered before repairing the leak. The clean air act prohibits releasing repairing the leak. The clean air act prohibits releasing refrigerant into the atmosphere.

Essential Piping design considerations:

Proper piping practices should be employed to ensure adequate oil return, even under the minimum load conditions with special consideration given to size and slope of the tubing.

Tubing returns from evaporator should be designed so as not to tarp oil and to prevent oil and refrigerant migration back to compressor during off-cycles.

Piping should be designed with adequate three-dimensional flexibility. When making up refrigerant piping, take every precaution to prevent dirt and moisture from entering the piping. It should not be in contact with the surrounding structure, unless proper tubing mount has been installed. This protection proves necessary to avoid excess vibration, which can be ultimately result in connection or tube failure due to fatigue or wear from abrasion, and excess vibration may be transmitted to the surrounding structure and generate an unacceptable noise level with in that structure as well.

Suction Lines:

If the evaporator lies above the compressor then suction line must have a loop at the evaporator outlet to prevent the refrigerant draining in to the compressor during off -cycles.

If the evaporator were situated below the compressor, the suction riser must be traped so as to prevent liquid refrigerant from collecting at the outlet of the evaporator while the system is idle. To ensure the proper oil return a gas velocity of 8 to 12 m/s is required with vertical run refrigerant lines and 4 m/s is required for horizontal run refrigerant lines. If the riser height is more than 4m additional U traps are required.

Suction lines should be sized for a maximum of 2 to 3°F (1.1 to 1.7°C) pressure loss. The actual pressure drop in PSI (kPa) will depend on the refrigerant.

Liquid Line:

The liquid line diameter should be as small as possible, while maintaining acceptable pressure drop. This will minimize the required refrigerant charge and increase compressor life. The actual line size should provide no more than a 2 to 3°F (1.1 to 1.7°C) pressure drop. The actual pressure drop in PSI (kPa) will depend on the refrigerant.

Temperature versus Pressure Drop:

Refrigerant	Suction Pressure Drop		Discharge Pressure Drop		Liquid Pressure Drop	
	°F (°C)	PSI (kPa)	°F (°C)	PSI (kPa)	°F (°C)	PSI (kPa)
R-22	2 (1.1)	2.91 (20.1)	1 (0.56)	3.05 (21.0)	1 (0.56)	3.05 (21.0)
R-407C	2 (1.1)	2.92 (20.1)	1 (0.56)	3.3 (22.8)	1 (0.56)	3.5 (24.1)
R-410A	2 (1.1)	4.5 (31.0)	1 (0.56)	4.75 (32.8)	1 (0.56)	4.75 (32.8)
R-134a	2 (1.1)	1.93 (13.3)	1 (0.56)	2.2 (15.2)	1 (0.56)	2.2 (15.2)

Note Suction and discharge pressure drops based on 100 equivalent feet (30.5 m) and 40°F (4.4°C) saturated temperature.

Inspection & Routine Maintenance

Regular inspection of all the chilling unit equipments reduces failures and ensures continuous operation.

A 'healthy' supply

CHECK IF INCOMING POWER IS AS PER THE RATED POWER SUPPLY:

VOLTS 380-420V

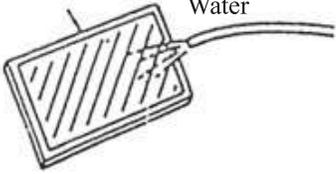
PHASE THREE PHASE

CYCLES 50 Hz

TYPE AC ONLY

Regular Inspection

Regular inspection must be carried out as follows:

Item	Period	Inspection Procedure
Filter cleaning (Air Handling Equipment)	Once a week	<div style="display: flex; justify-content: space-between;"> Filter hose </div>  <p data-bbox="690 1587 1386 1648">Remove the internal filter and wash it with water. Dry the filter in the shade and re-install it.</p>

General compressor checks	Once a week	Crankcase heater: Touch the heater body to verify that it is warm.
	Twice a year	Oil leaks: Verify that there are no oil leaks.
	Twice a year	Vibration isolation rubber: Inspect the vibration isolation rubber for wear.
Gas leak check	Four times a year	 <p>Conduct test for gas leaks in all refrigerant pipe joints.</p>
Control panel inspection	Four times a year	 <p>Inspect the circuits in the control panel and tighten loose wires.</p>

Troubleshooting

Faults and complaints in chilled water AC systems can be broadly classified under three areas. The first step in troubleshooting is to identify the area and diagnose the fault.

Diagnosing faults

Malfunctions can be classified under any of the following:

a) THE ELECTRICAL CIRCUIT

The malfunctioning of electrical circuit is due to LOW or HIGH voltage variations, frequent power failures, loose electrical contacts, defective electrical components, etc..

Problems due to power supply quality must be sorted out with concerned electricity board.

b) THE REFRIGERATION CIRCUIT

Improper cooling usually indicates poor performance of the refrigeration circuit. Reasons may be poor servicing, low / high gas in the system, non-condensable gases, and lower efficiency of the compressor.

c) THE CONDITIONED AIR CIRCUIT

Less air flow, poor cooling, uneven temperature, excessive air leaks are complaints that come under this classification.

Most of the above faults can be eliminated by periodical servicing. The troubleshooting chart that follows will help isolate the exact fault and suggest remedies.

SYMPTOMS	CAUSE	REMEDY
1. COMPRESSOR High discharge pressure	Non condensible gases Over charged refrigerant Choked condenser fins Less ODU airflow	Purge the system Remove excess Clean the ODU coil Reverse fan direction
Low discharge pressure	Low refrigerant charge	Check for leaks, repair and recharge
Low compression efficiency		Replace compressor
High suction pressure	Excessive load Defective suction valves	Reduce fresh air & load Replace compressor
Low suction pressure	Clogged suction strainer / dryer No cooling load Choked air filter	Clean / replace strainer / dryer Check thermostat Clean air filter
Compressor short cycles on low pressure	Thermostat erratic	Check thermostat
Compressor trips on high pressure	Air in the system Overcharged gas Condenser fan not working	Purge the system Remove excess charge Check ODU performance
Compressor noisy	Liquid knock Check for coil choke-up Defective valve reeds	Check return air filter / Replace compressor
Scroll compressor Compressor pressure does not build up to high pressure	Compressor motor working in reverse rotation	Interchange any two phases of polarity for changing direction
Compressor pressure does not go down on low pressure	— Do —	— Do —
Compressor noisy	— Do —	— Do —

2. BLOWER		
Fan motor not starting	Check power supply / fuses	Restore power supply
Tripping on over load Fuse blown	Check overload relay Check electrical circuit	Reset relay and replace
3. OVERALL UNIT		
Noisy operation	Blower touching scroll Bearing noise Belt loose Loose panels	Realign blower Lubricate bearings Tighten the belt Check & tighten screws
Unit operates continuously	Shortage of refrigerant Defective thermostat Unit undersized	Charge gas Replace thermostat Recheck heat load
4. CONDITIONED AREA		
Discomfort in the conditioned area	Less air flow	Check air filter / belt
	High humidity	Regulate fresh air
	Poor cooling	Check refrigeration circuit
Too warm in conditioned space	Excess heat load	Check & regulate heat load
	Inadequate cooling	Check compressor 'ON'/ Check filter choke up
	Less airflow	Check reversal of blower fan
	Compressor trips soon after start	Change incoming supply phase polarity on any two phases (for scroll compressor)
Too cold in conditioned space	Defective thermostat Contactor stuck up	Replace thermostat Replace contactor

From: Md Azharuddin <mdazharuddin@bluestarindia.com>
Sent: 17 January 2023 21:08
To:
Cc: Deb'
Subject: KORBA FGD - ACCESSORIES OF CONDENSING UNIT

Dear Ma'am,

Continuing the below mail, find here the reply from Blue Star Ltd on list of Accessories required for Air Cool Condensing Unit

ACCESSORIES	REMARK
Suction & discharge stop valves	NR
Muffler	NR
Crank case heaters	Yes Available
Oil filters	NR
Temperature indicators for lube oil/heaters	NR
Oil level indicators	NR (Sight glass available on compressor)
Safety thermostat for crank case heater	NR
Pressure Gauge at each Stage	NR
Magnetic Oil Separator	NR
High/Low Pressure Cut outs	Yes Available
Oil Pressure Switches	NR
Relief Valve	Yes Available

*NR - Not required

Azhar

From: Md Azharuddin [mailto:mdazharuddin@bluestarindia.com]
Sent: 13 January 2023 12:11
To: 'Farida Jalal'
Cc: 'Sushil kumar gupta'; 'vipinnauni@bhel.in'; 'Aditya IV'; 'Sumit Chaudhary'; 'Ashish Kumar Deb'
Subject: KORBA FGD - ACCESSORIES OF CONDENSING UNIT

Dear Ma'am,

This is in reference to you for the Accessories of Korba Project Air Cool Condensing Unit model no - ACUY2S-070ER2 . You know that the unit is standard Air Cooled Condensing Unit with Scroll Chiller which is different from Screw Chiller so the accessories of AUCUs will also be different from Screw Chiller. We have all already supplied ACUs in our previous project to NTPC along with where we have supplied required accessories to run the chiller effectively.

Referring your requirement, Find below the requirement of accessories for ACUs

ACCESSORIES	Remark
Suction & discharge stop valves	NR
Muffler	NR
Crank case heaters	Yes Available
Oil filters	NR
Temperature indicators for lube oil/heaters	NR
Oil level indicators	NA (Sight glass available on compressor)
Safety thermostat for crank case heater	NR

Azhar

From: vipinnauni@bhel.in [mailto:vipinnauni@bhel.in]

Sent: 10 January 2023 15:27

To: MDAZHARUDDIN@BLUESTARINDIA.COM

Cc: 'Sushil kumar gupta'; 'Farida Jalal'

Subject: KORBA FGD - LETTER FOR ACCESSORIES OF CONDENSING UNIT

** This mail has been sent from outside Blue Star. Please open attachments / links after validating credentials.

**

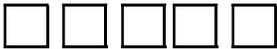
Sir

As discussed, kindly include the accessories missing in the enclosed letter and send. The same is required for approval of condensing unit from NTPC for Korba FGD project.

Regards

Vipin Nauni | PEM-MAUX | 0120-4213519 | 9811950776

Follow us on :



इलेक्ट्रॉनिक ट्रांसमिशन संदेश- ई-मेल के लिए डिस्कलेमर

इस इलेक्ट्रॉनिक ट्रांसमिशन संदेश में दी गई जानकारी अर्थात ई-मेल और इस इलेक्ट्रॉनिक संदेश के साथ प्रेषित कोई अटैचमेंट केवल प्रेषिती (प्रेषितियों) के उपयोग के लिए है और इसमें व्यक्ति विशेष के लिए, गोपनीय या विशेष रूप से अधिकृत जानकारी हो सकती है। यदि यह जानकारी आपके लिए नहीं है तो आपको इस ई-मेल को प्रसारित, वितरित या कॉपी न करें। यदि आपको यह संदेश गलती से मिला है, तो आपको इस संदेश को नष्ट करना चाहिए और ई-मेल द्वारा प्रेषक को सूचित कर दें।

ई-मेल ट्रांसमिशन सुरक्षित या त्रुटिरहित होने की गारंटी नहीं है, क्योंकि जानकारी ट्रांसमिशन के दौरान अवरुद्ध हो सकती है, विकृत हो सकती है, खो सकती है, नष्ट हो सकती है, देर से या अपूर्ण रूप में पहुंच सकती है, या वायरस से ग्रस्त हो सकती है। इसलिए, ई-मेल और इसकी विषय-वस्तु (निर्दिष्ट त्रुटियों के साथ या उनके बगैर) की जिम्मेवारी ई-मेल तैयार करने वाले / प्रेषक या बीएचईएल या उसके सहयोगियों की नहीं होगी। इस ई-मेल में उल्लिखित विचार या राय, यदि कोई हो, प्रेषक के ही हैं। यह आवश्यक नहीं है कि ये बीएचईएल या इसकी सहयोगी कंपनियों के विचार या राय के साथ मेल खाएं। लक्षित प्राप्तकर्ता ई-मेल या इसकी विषय-वस्तु पर कार्रवाई करने से पहले वैकल्पिक संचार तंत्र के माध्यम से जानकारी या निहितार्थ को सत्यापित करवा सकते हैं।

INDEX					
PROJECT NAME		KORBA- FGD			
CUSTOMER		NTPC Limited			
EPC CONTRACTOR		BHARAT HEAVY ELECTRICALS LTD			
SUPPLIER					
PACKAGE		HVAC FOR FGD			
DOCUMENT NO.		PE-V0-466-(571-13000-A)-A219			
TOTAL NO. OF PAGES		93			
S. NO.	APPLICATION	FAN TYPE	MOTOR KW/P	LOAD BkW	PAGE NO.
1	40000 CMH @ 15mm Roof Extractor	RE Fan	5.5 KW / 6 pole	4.16 KW	03-09
2	10000 CMH @ 20mm Axial Fan	Supply Air Fan	1.5 KW / 6 Pole	1.05 KW	10-16
3	10000 CMH @ 30mm Axial Fan	Supply Air Fan	2.2 KW / 4 Pole	1.54 KW	17-23
4	15000 CMH @ 10mm Axial Fan	Exhaust Air Fan	1.1 KW / 6 Pole	0.96 KW	24-30
	6000 CMH @ 20mm Axial Fan	Supply Air Fan		0.71 KW	
5	4000 CMH @ 30mm Axial Fan	Supply Air Fan	0.75 KW / 2 Pole	0.485 KW	31-37
6	6000 CMH @ 30mm Axial Fan	Supply Air Fan	1.1 KW / 2 Pole	0.854 KW	38-44
		Fresh Air Fan			
7	4000 CMH @ 10mm Axial Fan	Exhaust Air Fan	0.55 KW/ 4 Pole	0.25	45-51
8	AHU Centrifugal Fan	Centrifugal Fan	15 KW / 4 Pole	9.51 KW	52-58
	UAF Pump	Centrifugal Pump		9.34 KW	
9	7500 CMH @ 15mm Axial Fan	Bifurcated Exhaust Fan	1.1 KW / 6 Pole (FLP)	0.6 KW	59-65
10	2000 CMH @ 15mm Axial Fan	Bifurcated Exhaust Fan	0.55 KW / 4 Pole (FLP)	0.37 KW	66-72
11	10000 CMH @ 10mm Axial Fan	Exhaust Air Fan	0.75 KW / 6 Pole	0.58 KW	73-79
12	UAF Centrifugal Fan	Centrifugal Fan	37 KW / 4 Pole	30.9 KW	80-86



**DATA SHEET:
INDUCTION MOTOR**

**Motor Type
2HE3 133-06**

No. of Phases		3	Reference Standard		IS:12615
Frame Designation		132M	Protection IS:4691		IP 55
Rated Output	KW	5.5	Vibration Standard		IS:12075
	HP	7.5	Noise Standard		IS:12065
No. of Poles		6	Duty		S1
Rated Voltage		V	Insulation Class		F
Rated Frequency		Hz	Cooling IS:6362		IC411
Rated Current		A	Terminal Box Details	Type	HM3GN
Rated Speed		rpm		Terminal Size	M5
Rated Torque		kgm		No. of Terminal	6
Efficiency	Full load	%	88.0	Max. cable size (AL)	mm ² 1x3Cx10.0
	3/4 load	%	88.0	DE	6208ZZ
	1/2 load	%	86.0	NDE	6208ZZ
Power factor	Full load		0.79	Lubrication	Prelubricated
	3/4 load		0.72	Life L10 (Direct Coupled)	hrs. 50,000
	1/2 load		0.63	Regreasing Time	hrs. -
Max. Temp. Rise (Res.)		°C	70	Lifting Eyebolt	M10
Acceleration Time		sec.	-	Motor Weight (approx)	kg 70.0
Stator Connection			D	Rotor GD ²	kgm ² 0.1487
Tropicalised? (Yes / No)			Yes	Ambient Temp.	°C 50
I _{st} / I _r			7.5	Overall Dimensions of Packed motor (LxBxH) (mm)	
T _{st} / T _r			2.6	-	
T _{po} / T _r			3.0	Voltage Variation ±	% 10
Locked rotor withstand time	Hot	sec.	5	Frequency Variation ±	% 5
	Cold	sec.	13	Combiend Variation ±	% 10

- Remarks:
- (1) Efficiency Class : IE3
 - (2) Motor Construction : TEFC
 - (3) Suitable Cable Gland & Lugs BY AVPL
 - (4) Minimum Starting Voltage : 80%
 - (5) Permissible Fault Level: 50KA for 0.25 sec
 - (6) No. of Hot/Cold Starts: 3/3

Data subject to tolerance as per IEC 60034-1

Prep.: Engg

Chkd.:

Date:

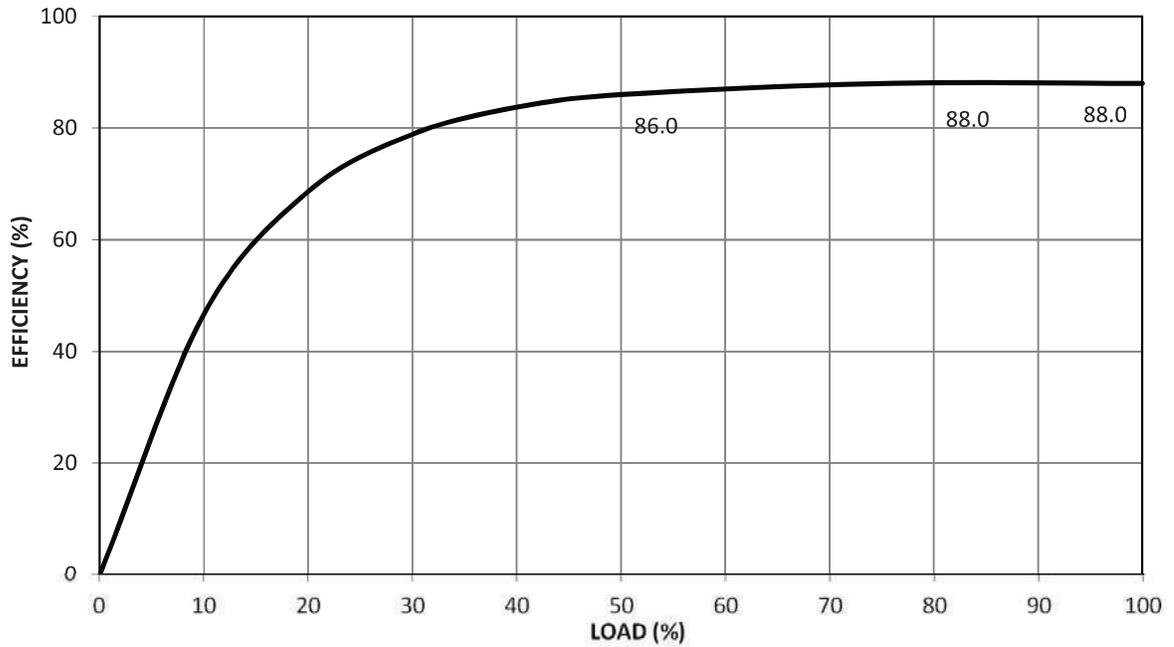
Date:

Rated Output (kW/HP) : 5.5/7.5

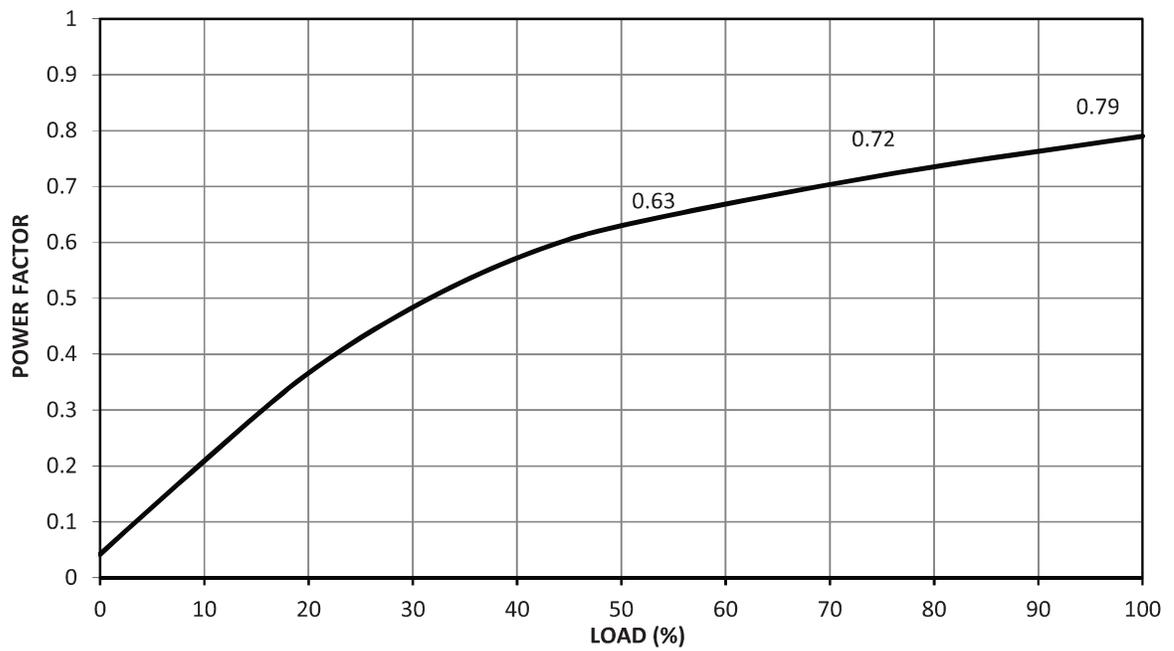
Poles : 6

Efficiency Class : IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

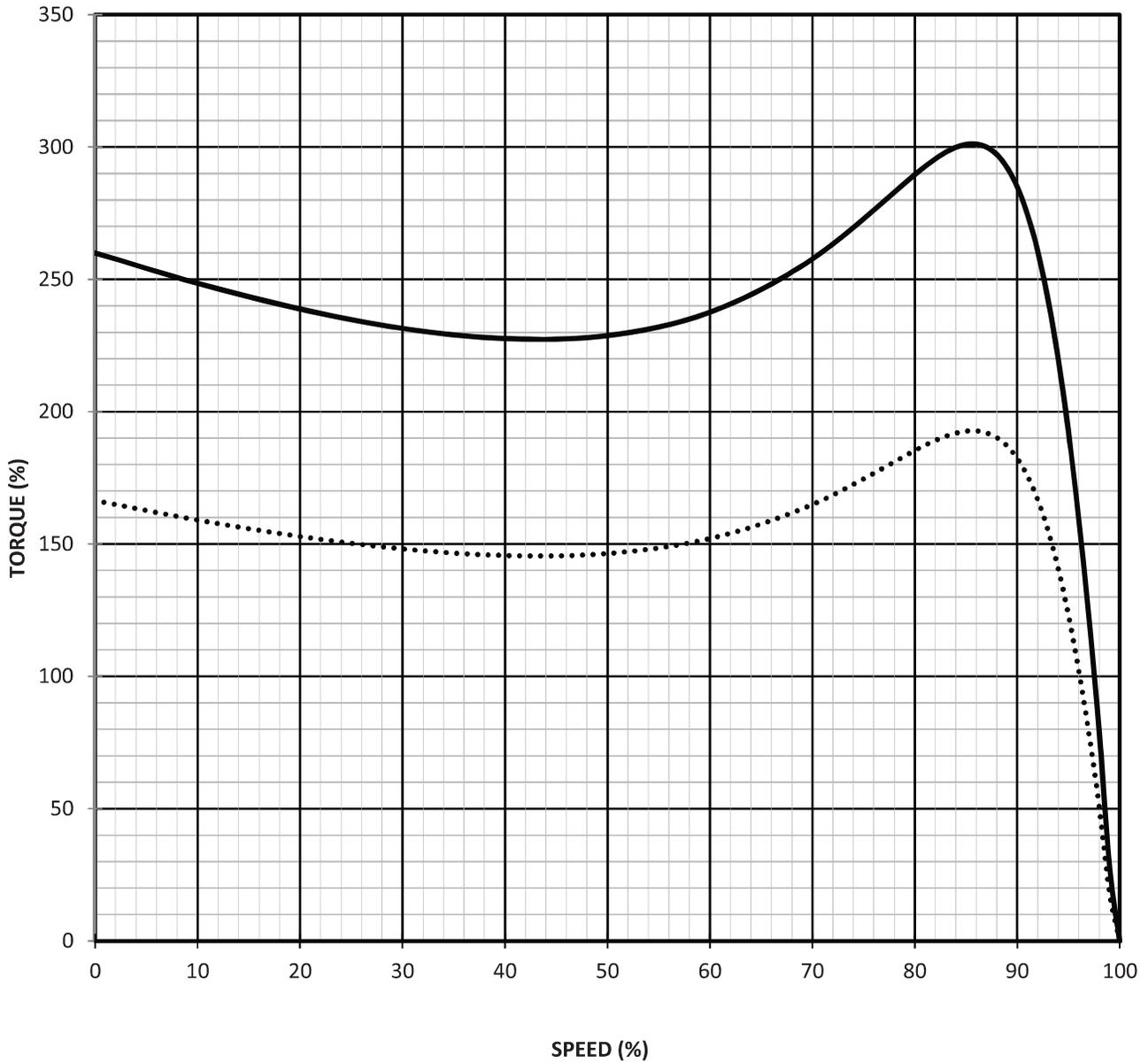


Rated Output (kW/HP) : 5.5/7.5

Poles : 6

Efficiency Class : IE3

TORQUE SPEED CURVE

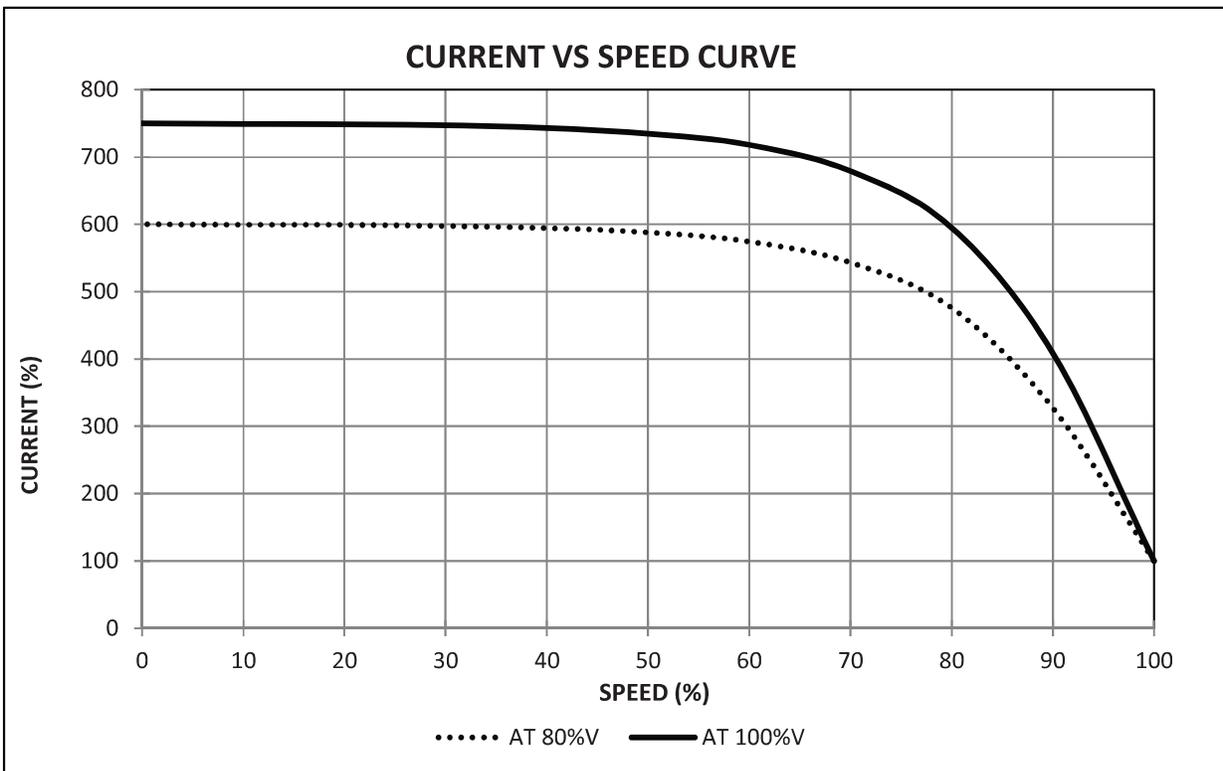
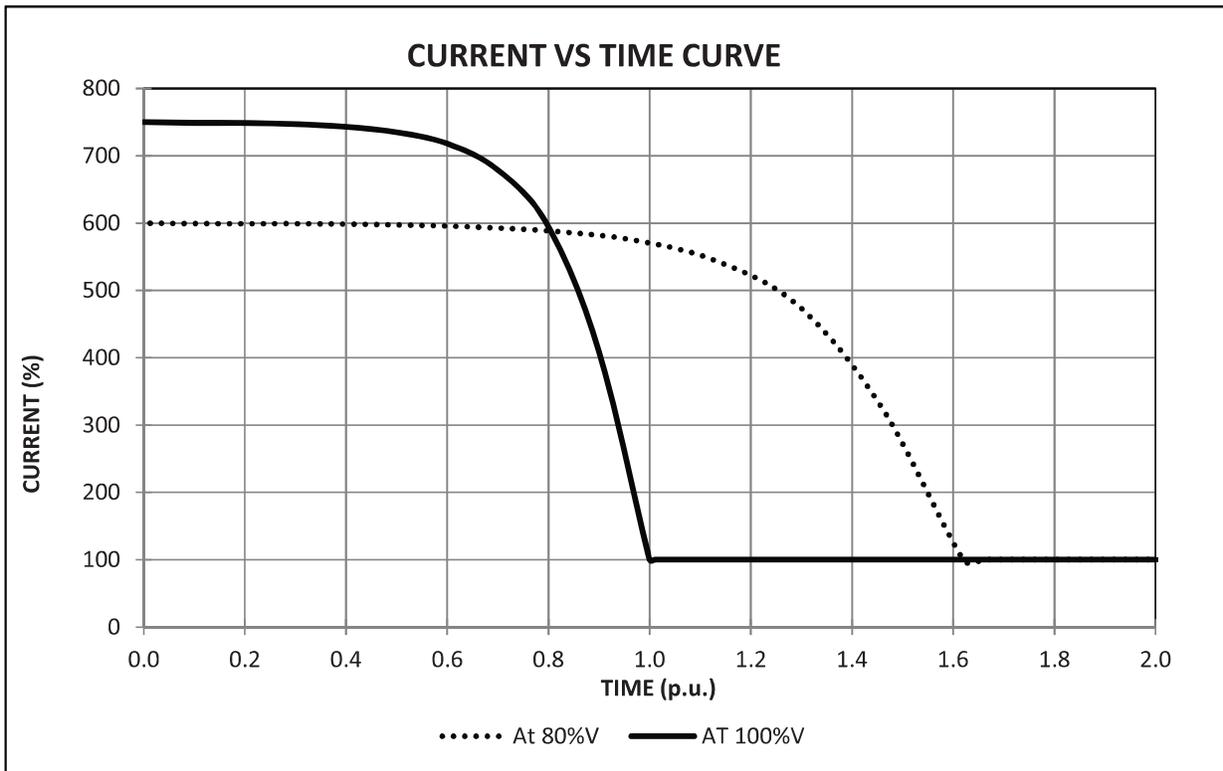


..... At 80%V ——— At 100%V

Rated Output (kW/HP) : 5.5/7.5

Poles : 6

Efficiency Class : IE3

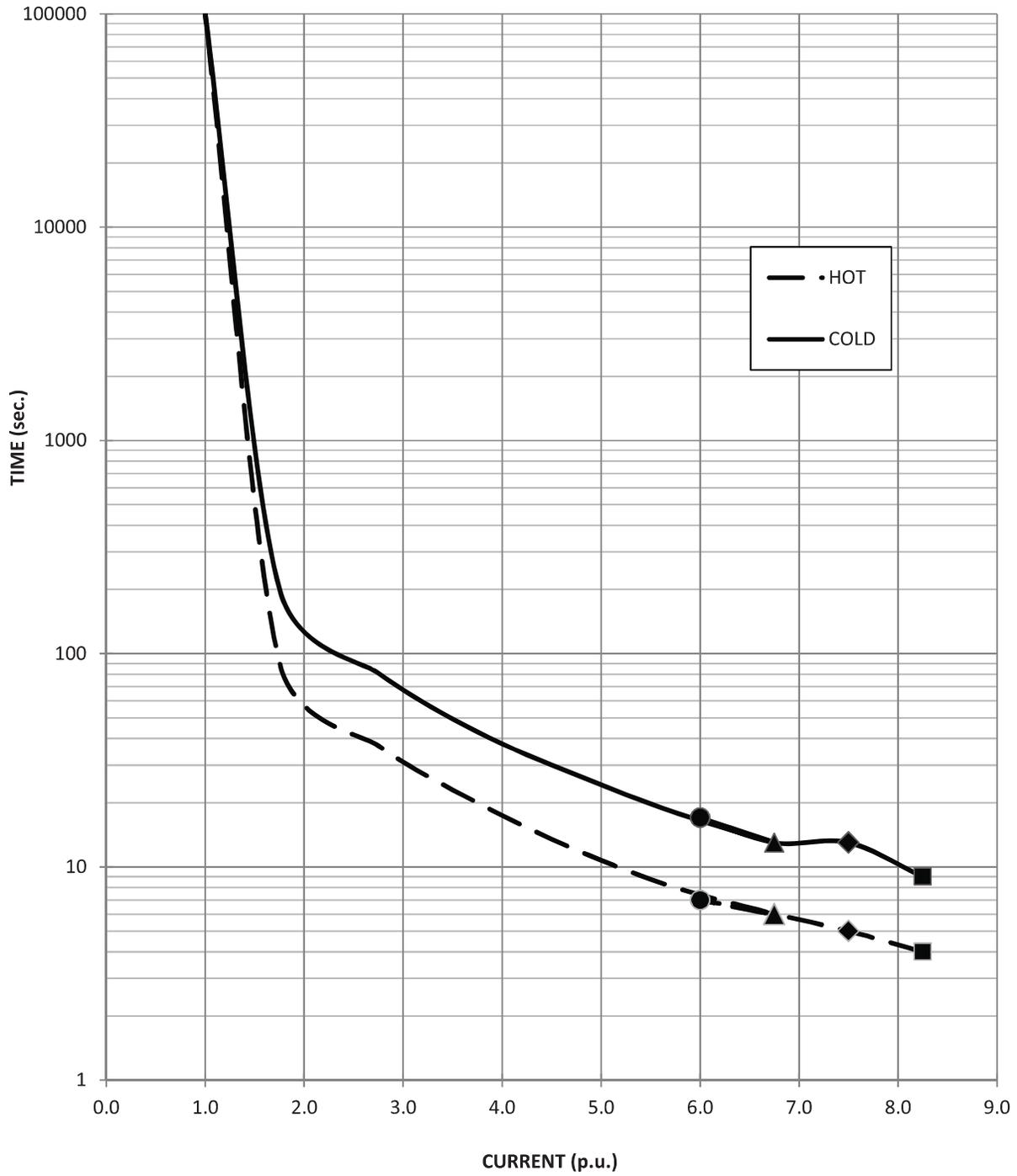


Rated Output (kW/HP) : 5.5/7.5

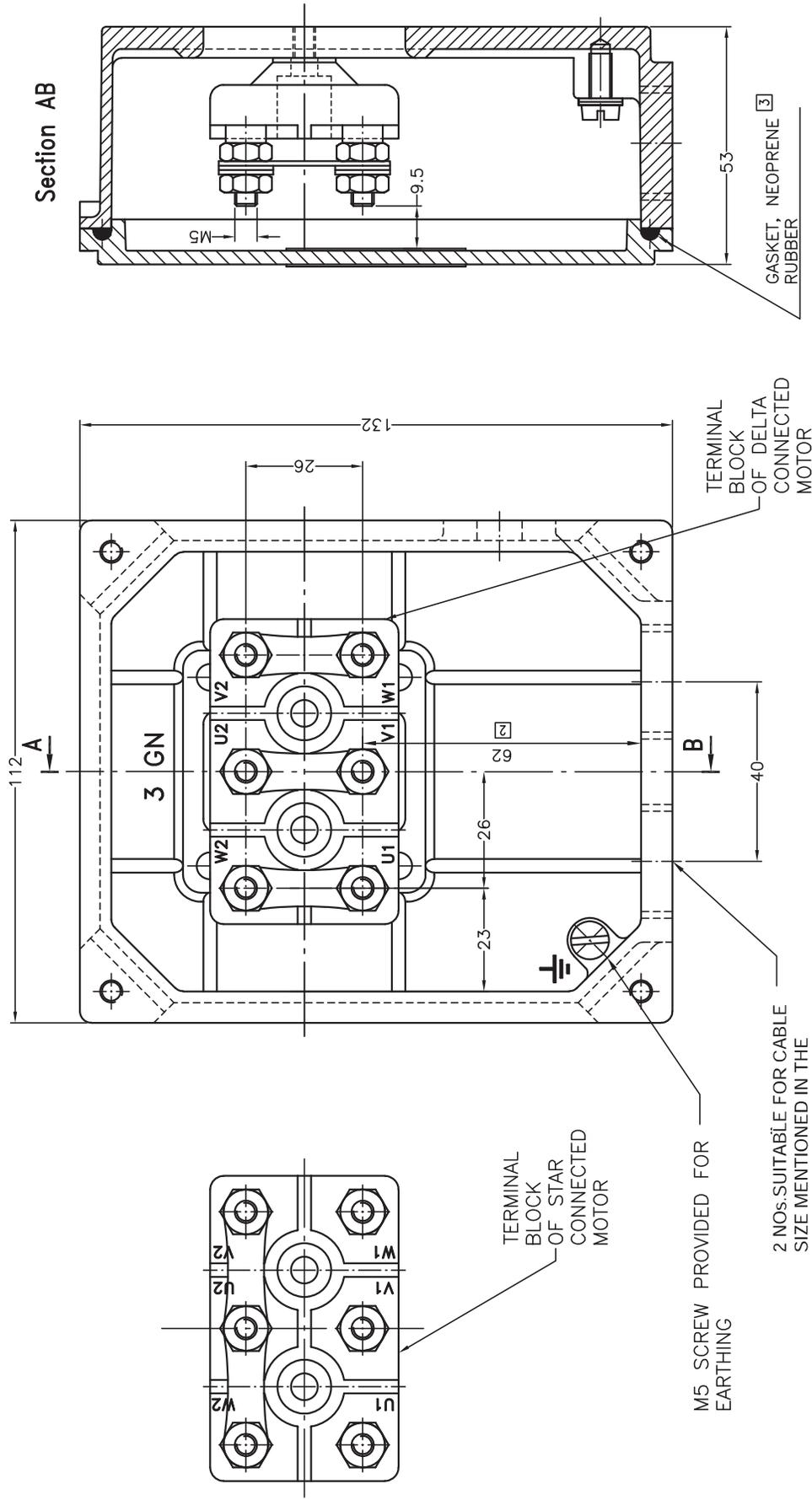
Poles : 6

Efficiency Class : IE3

THERMAL WITHSTAND CURVE



■ At 110%V ◆ At 100%V ▲ At 90%V ● At 80%V



REV. STATUS	[3]	GASKET INDICATED IN SECTION AB	ARUN	07/12/16	
	[2]	DIM. 62 SPECIFIED, STANDARD ADDED IN TITLE	P.M. RAJESH	21/02/15	
		[1]	DRAWING REDRAWN ON NEW CAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.	NIMKAR	05/07/13
		STANDARD TERMINAL BOX ASSEMBLY			
Dim. without tolerance as per IS:2102 very coarse All dimensions in mm unless otherwise specified.		SCALE NTS SHT 1/1	FRAME SIZE 100-132 (GN)		
NO MACHINING ~ ROUGH MACHINING ▽ SMOOTH MACHINING ▽▽ FINE MACHINE/GRIND ▽▽▽ POLISH/HONE/LAP ▽▽▽▽ MACHINING SYMBOLS	NAME GAMESH DATE 02/08/11	DRG. NO.: A3-100/132-33(GN)	REV. 3		
	DRN. S.P.JADIA CHD. 02/08/11	REF. 10-13-TBOX-ASSLY			
	APPD. S.P.JADIA DATE 02/08/11				



**DATA SHEET:
INDUCTION MOTOR**

**Motor Type
2HE3 106-06**

No. of Phases		3	Reference Standard		IS:12615	
Frame Designation		100L	Protection IS:4691		IP 55	
Rated Output	kW	1.5	Vibration Standard		IS:12075	
	HP	2.0	Noise Standard		IS:12065	
No. of Poles		6	Duty		S1	
Rated Voltage	V	415	Insulation Class		F	
Rated Frequency	Hz	50	Cooling IS:6362		IC411	
Rated Current	A	3.3	Terminal Box Details	Type	HM3GN	
Rated Speed	rpm	945		Terminal Size	M5	
Rated Torque	kgm	1.55		No. of Terminal	6	
Efficiency	Full load	%	82.5	Max. cable size (Cu)	mm ² 1x3Cx2.5	
	3/4 load	%	82.5	DE	6206ZZ	
	1/2 load	%	80.0	NDE	6206ZZ	
Power factor	Full load		0.77	Bearing Data	Lubrication	Prelubricated
	3/4 load		0.71		Life L10 (Direct Coupled)	hrs. 50,000
	1/2 load		0.60		Regreasing Time	hrs. -
Max. Temp. Rise (Res.)	°C	70	Lifting Eyebolt		M8	
Acceleration Time	sec.	-	Motor Weight (approx)		kg 34.0	
Stator Connection		Y	Rotor GD ²		kgm ² 0.0336	
Tropicalised? (Yes / No)		Yes	Ambient Temp.		°C 50	
I _{st} / I _r		5.5	Overall Dimensions of Packed motor (LxBxH) (mm)			
T _{st} / T _r		2.2				
T _{po} / T _r		2.6	Voltage Variation ±		% 10	
Locked rotor withstand time	Hot	sec.	10	Frequency Variation ±		% 5
	Cold	sec.	23	Combiend Variation ±		% 10

Remarks: (1) Efficiency Class : IE3
 (2) Motor Construction : TEFC
(3) Suitable Cable Gland & Lugs BY AVPL
(4) Minimum Starting Voltage : 80%
(5) Permissible Fault Level: 50KA for 0.25 sec
(6) No. of Hot/Cold Starts: 3/3

Data subject to tolerance as per IEC 60034-1

Prep.: Engg

Chkd.:

Date:

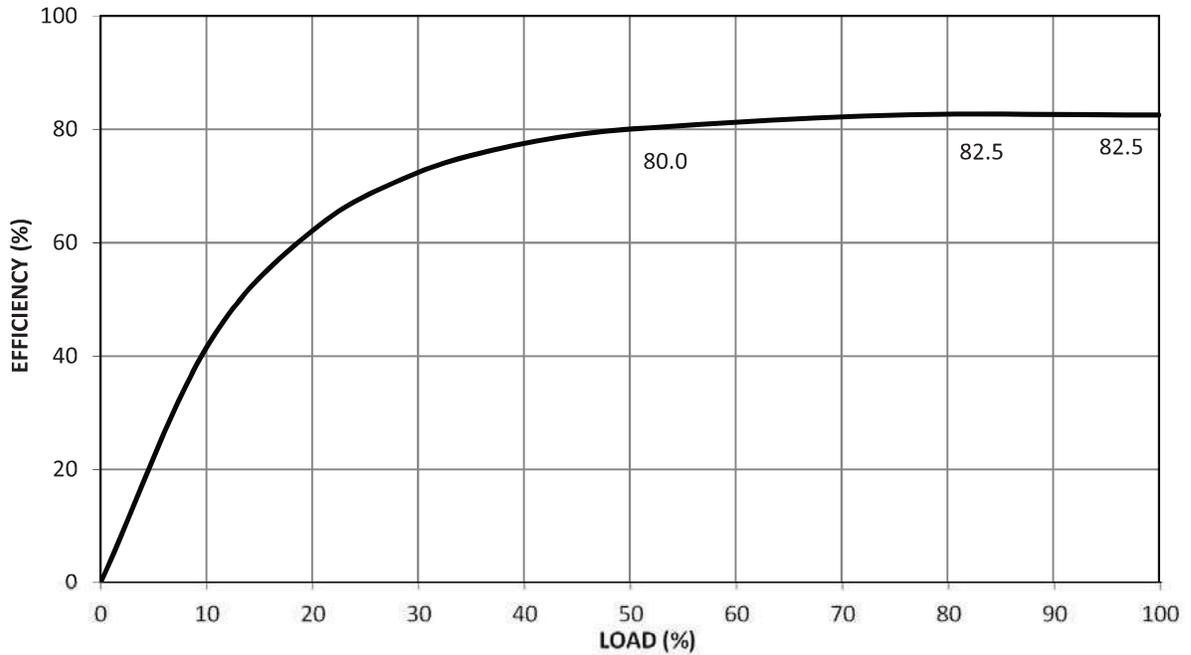
Date:

Rated Output (kW/HP) : 1.5/2.0

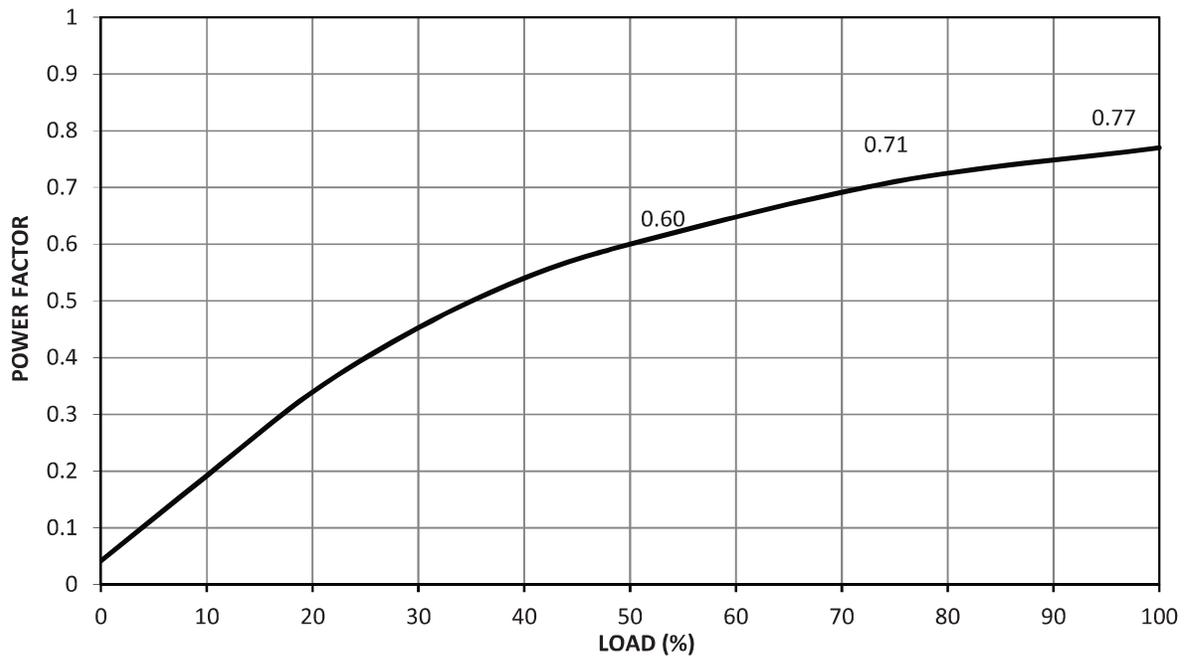
Poles : 6

Efficiency Class : IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

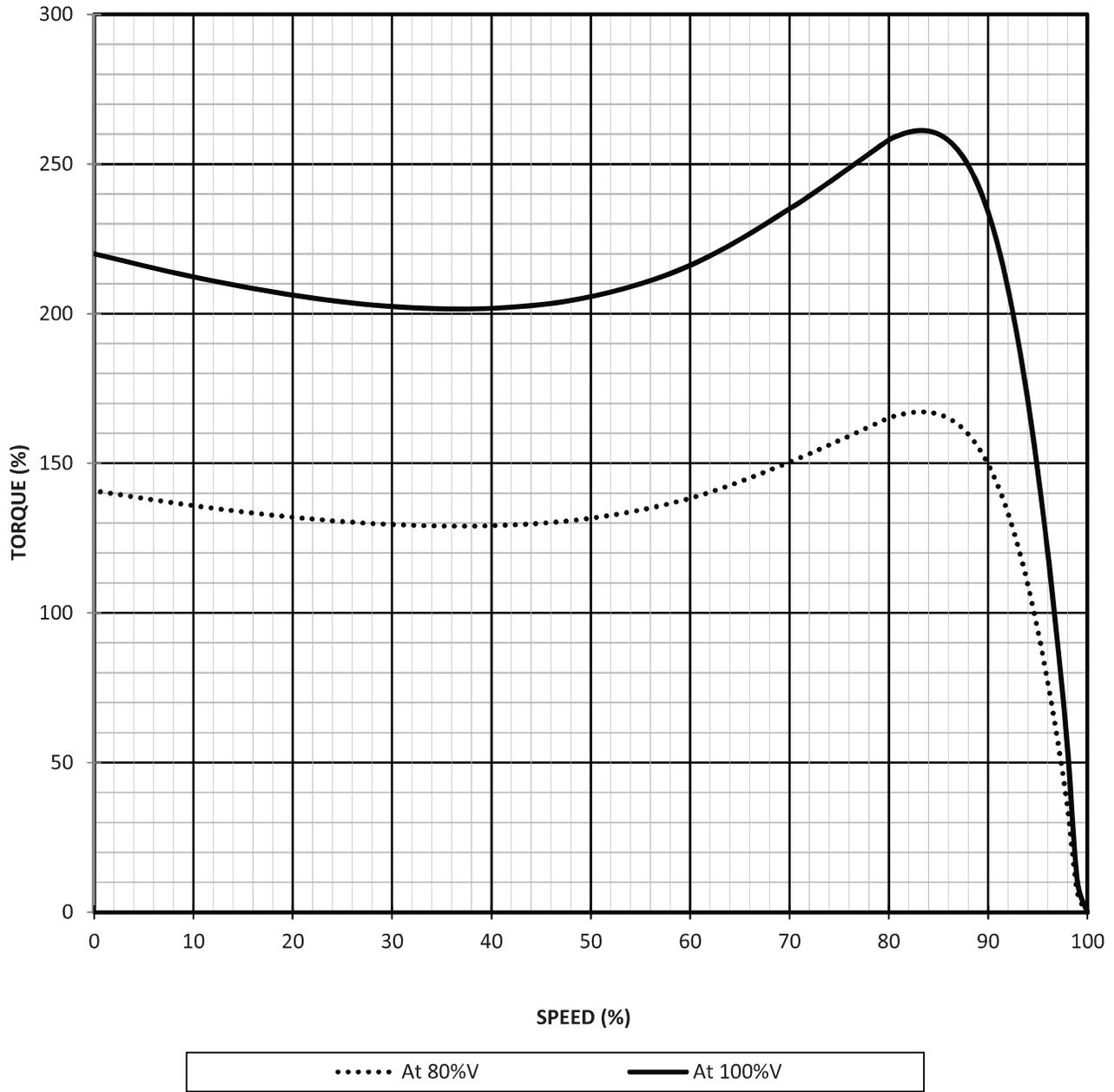


Rated Output (kW/HP) : 1.5/2.0

Poles : 6

Efficiency Class : IE3

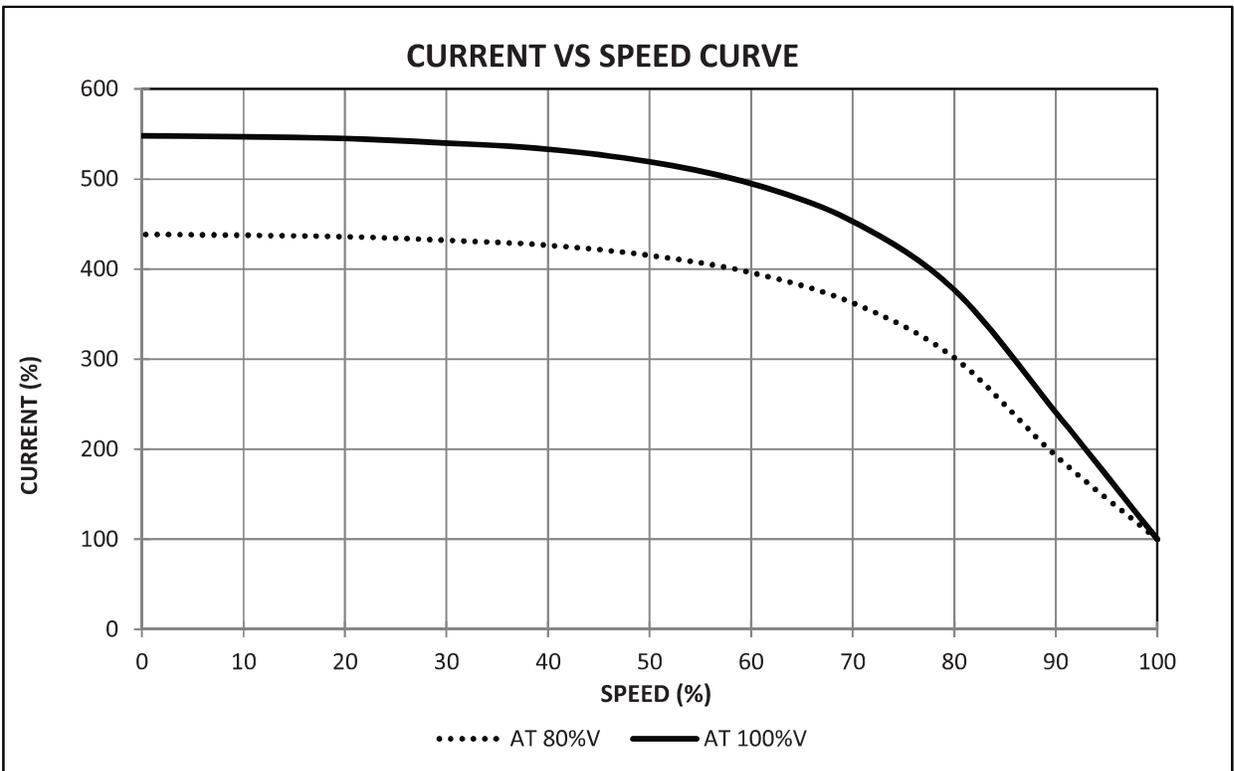
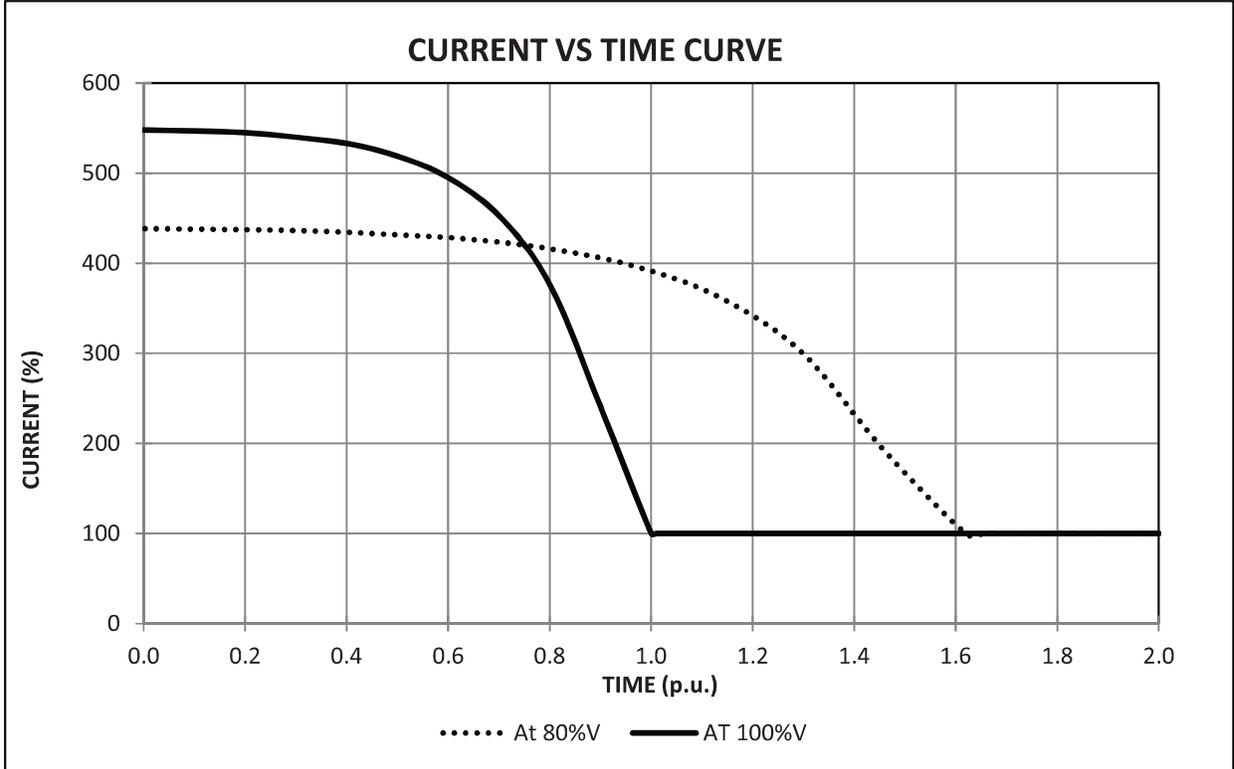
TORQUE SPEED CURVE



Rated Output (kW/HP) : 1.5/2.0

Poles : 6

Efficiency Class : IE3

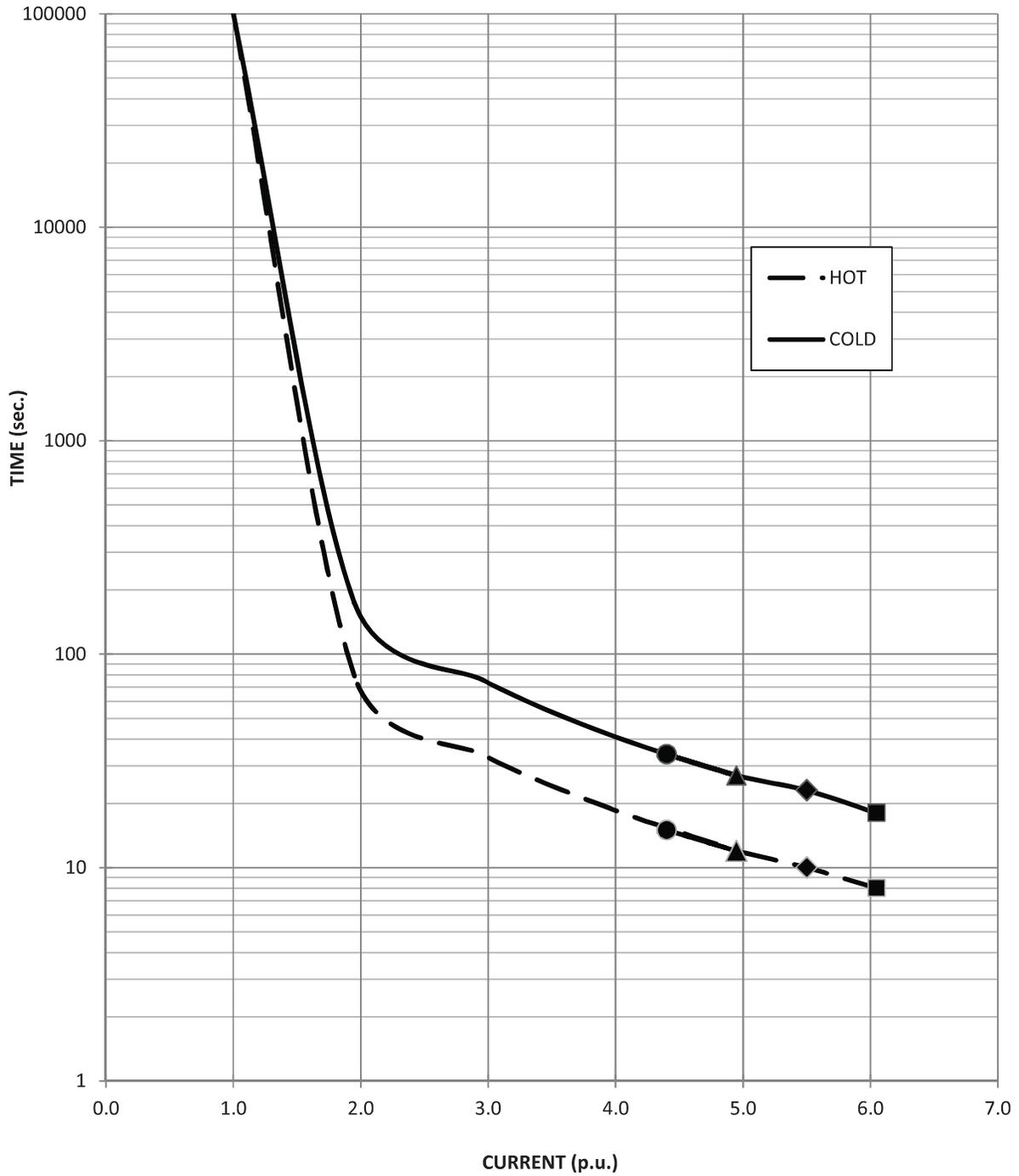


Rated Output (kW/HP) : 1.5/2.0

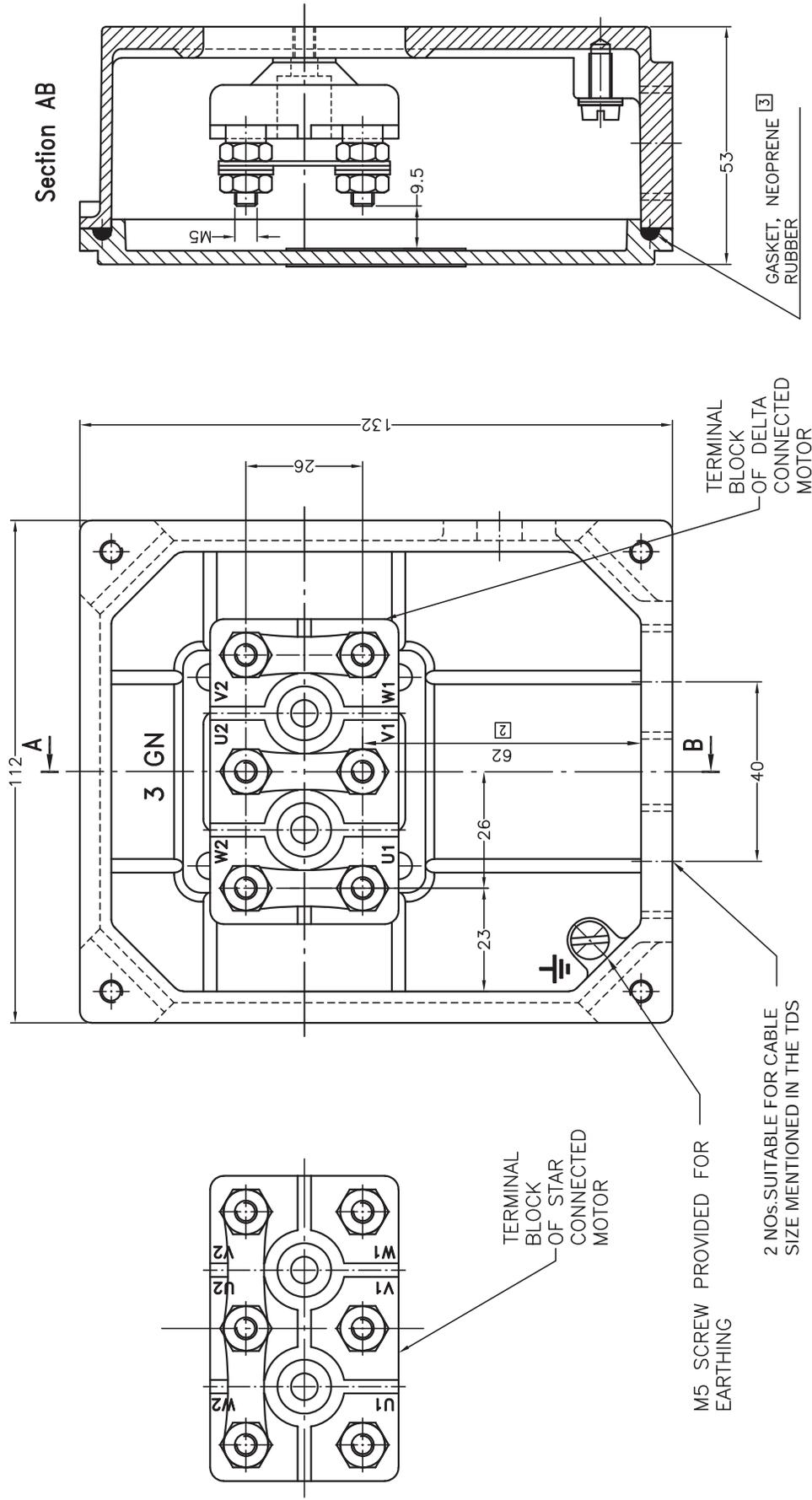
Poles : 6

Efficiency Class : IE3

THERMAL WITHSTAND CURVE



■ At 110%V ◆ At 100%V ▲ At 90%V ● At 80%V



REV. STATUS	3	GASKET INDICATED IN SECTION AB	ARUN	07/12/16
	2	DIM. 62 SPECIFIED, STANDARD ADDED IN TITLE	P.M. RAJ	21/02/15
	1	DRAWING REDRAWN ON NEW CAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.	NIMKAR	05/07/13
		STANDARD TERMINAL BOX ASSEMBLY		
Dim. without tolerance as per IS:2102 very coarse All dimensions in mm unless otherwise specified.		DRG. NO.: A3-100/132-33(GN)	SCALE 1/1	NTS 100-132 (GN)
NO. MACHINING ~	NAME GAMESH	DATE 02/08/11	REF. 10-13-TBOX-ASSLY	
ROUGH MACHINING ▽	DRN. S.P.JADIA	CHD. 02/08/11	APPD. S.P.JADIA 02/08/11	
SMOOTH MACHINING ▽▽	MACHINING SYMBOLS			
FINE MACHINE/GRIND ▽▽▽	PROJECTION 			
POLISH/HONE/LAP ▽▽▽▽	REV. 3			
		FRAME SIZE 100-132 (GN)		

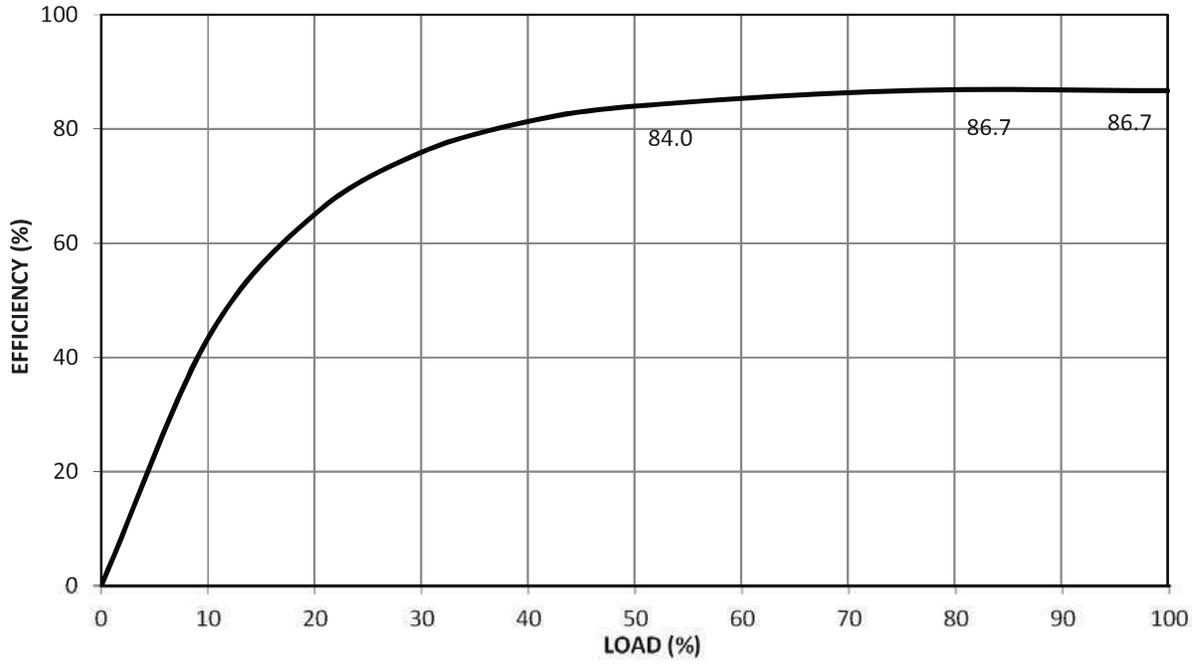
			DATA SHEET: INDUCTION MOTOR		Motor Type 2HE3 106-04			
No. of Phases			3	Reference Standard		IS:12615		
Frame Designation			100L	Protection IS:4691		IP 55		
Rated Output	kW		2.2	Vibration Standard		IS:12075		
	HP		3.0	Noise Standard		IS:12065		
No. of Poles			4	Duty		S1		
Rated Voltage			V	415	Insulation Class		F	
Rated Frequency			Hz	50	Cooling IS:6362		IC411	
Rated Current			A	4.3	Terminal Box Details	Type	HM3GN	
Rated Speed			rpm	1440		Terminal Size	M5	
Rated Torque			kgm	1.49		No. of Terminal	6	
Efficiency	Full load	%	86.7	Max. cable size (Cu)		mm ²	1x3Cx2.5	
	3/4 load	%	86.7	DE	6206ZZ			
	1/2 load	%	84.0	NDE	6206ZZ			
Power factor	Full load		0.82	Bearing Data	Lubrication	Prelubricated		
	3/4 load		0.78		Life L10 (Direct Coupled)	hrs.	50,000	
	1/2 load		0.67		Regreasing Time	hrs.	-	
Max. Temp. Rise (Res.)			°C	70	Lifting Eyebolt		M8	
Acceleration Time			sec.	-	Motor Weight (approx)		kg	34.0
Stator Connection				D	Rotor GD ²		kgm ²	0.0237
Tropicalised? (Yes / No)				Yes	Ambient Temp.		°C	50
I _{st} / I _r				7.5	Overall Dimensions of Packed motor (LxBxH) (mm)			
T _{st} / T _r				2.5				-
T _{po} / T _r				3.0	Voltage Variation ±		%	
Locked rotor withstand time	Hot	sec.	5	Frequency Variation ±		%	5	
	Cold	sec.	13	Combiend Variation ±		%	10	
Remarks: (1) Efficiency Class : IE3 (2) Motor Construction : TEFC (3) Suitable Cable Gland & Lugs BY AVPL (4) Minimum Starting Voltage : 80% (5) Permissible Fault Level: 50KA for 0.25 sec (6) No. of Hot/Cold Starts: 3/3								
Data subject to tolerance as per IEC 60034-1								
Prep.: Engg			Chkd.:					
Date:			Date:					

Rated Output (kW/HP) : 2.2/3.0

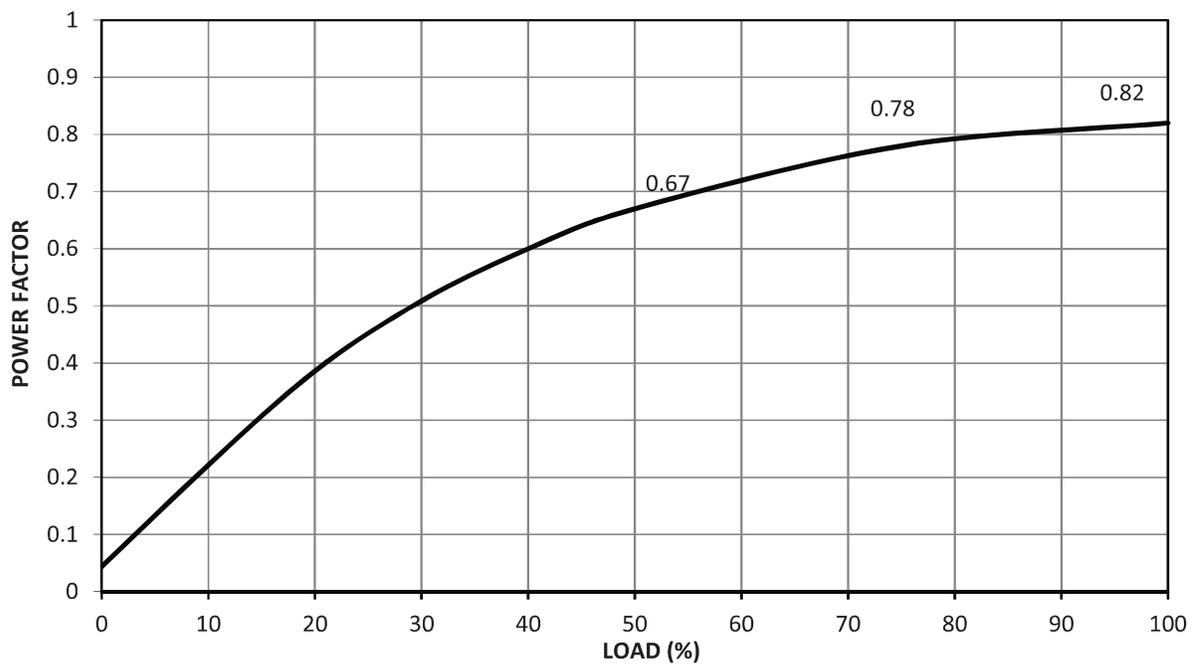
Poles : 4

Efficiency Class : IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

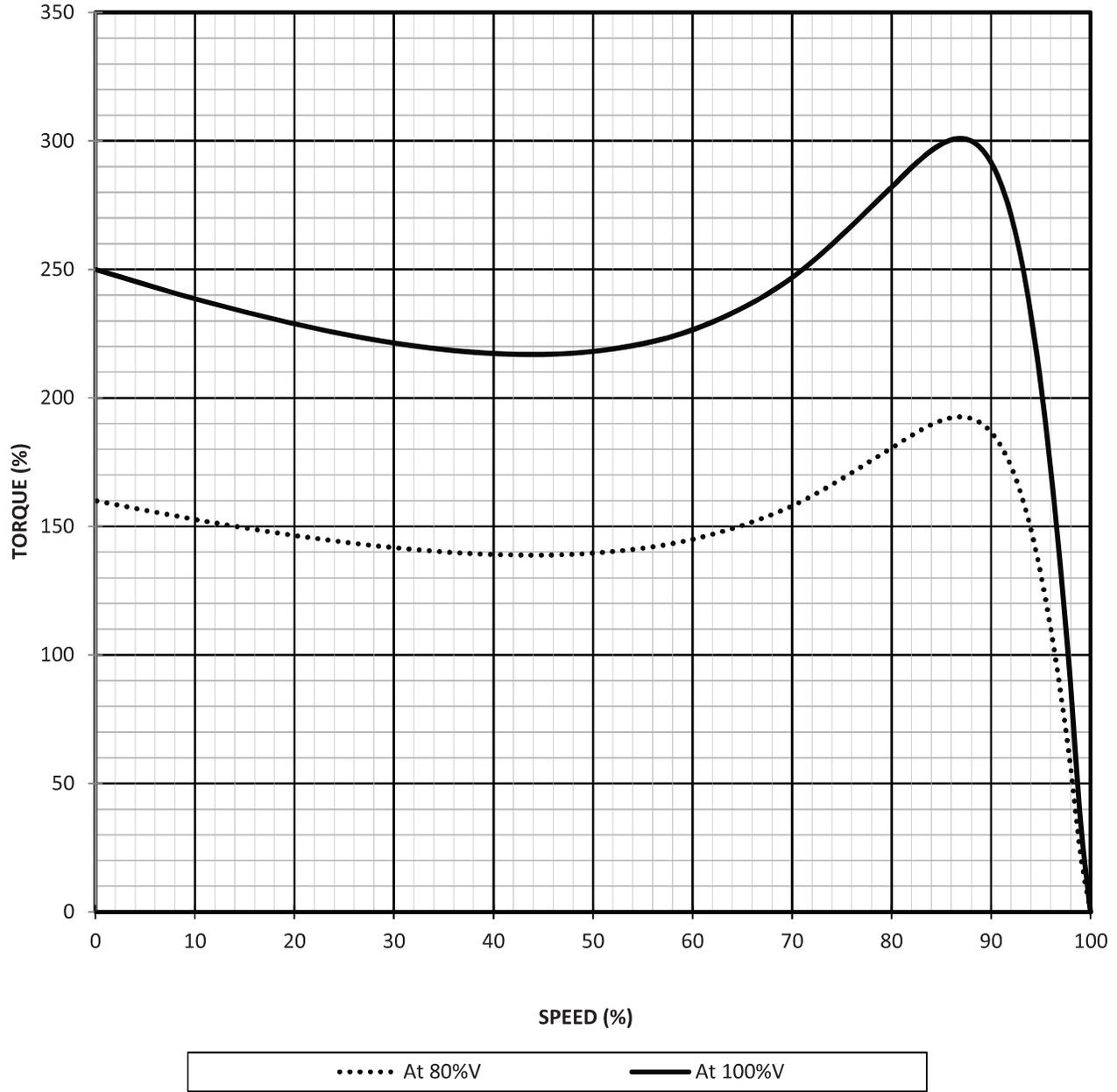


Rated Output (kW/HP): 2.2/3.0

Poles : 4

Efficiency Class : IE3

TORQUE SPEED CURVE



Prep.:

SK

Date:

25-12-2021

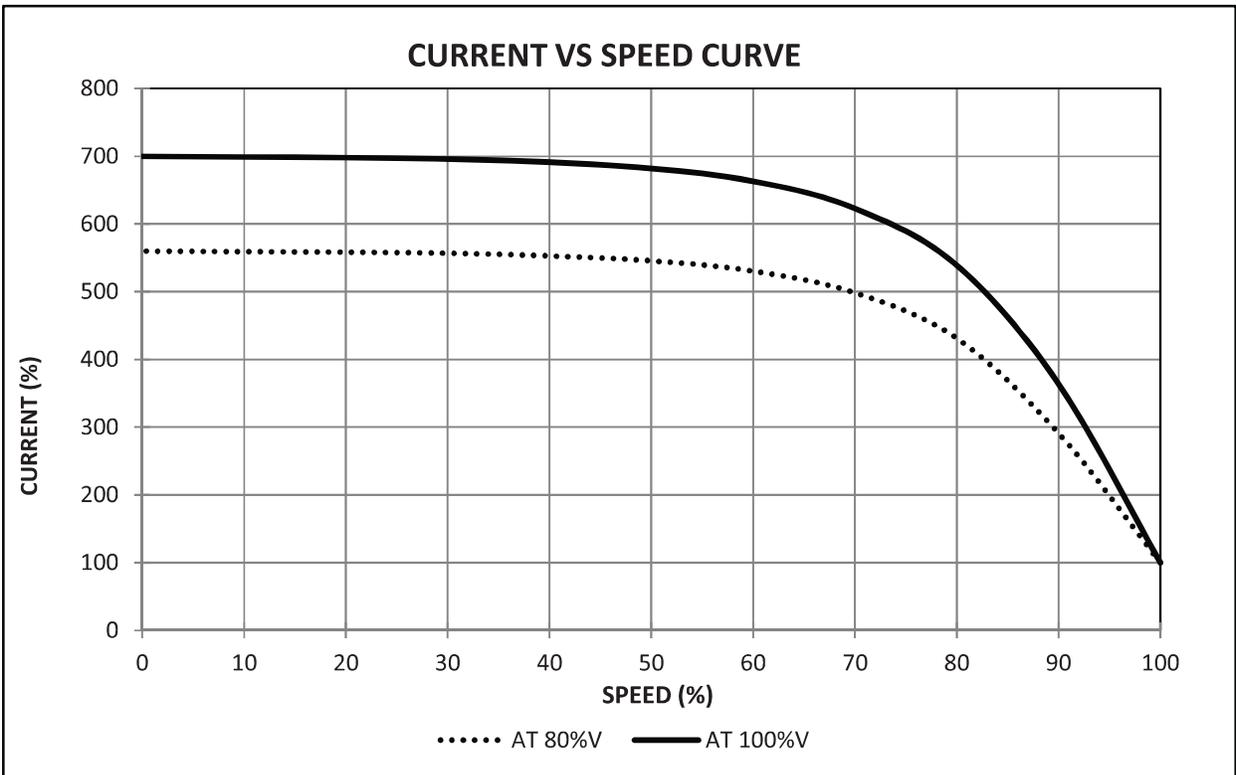
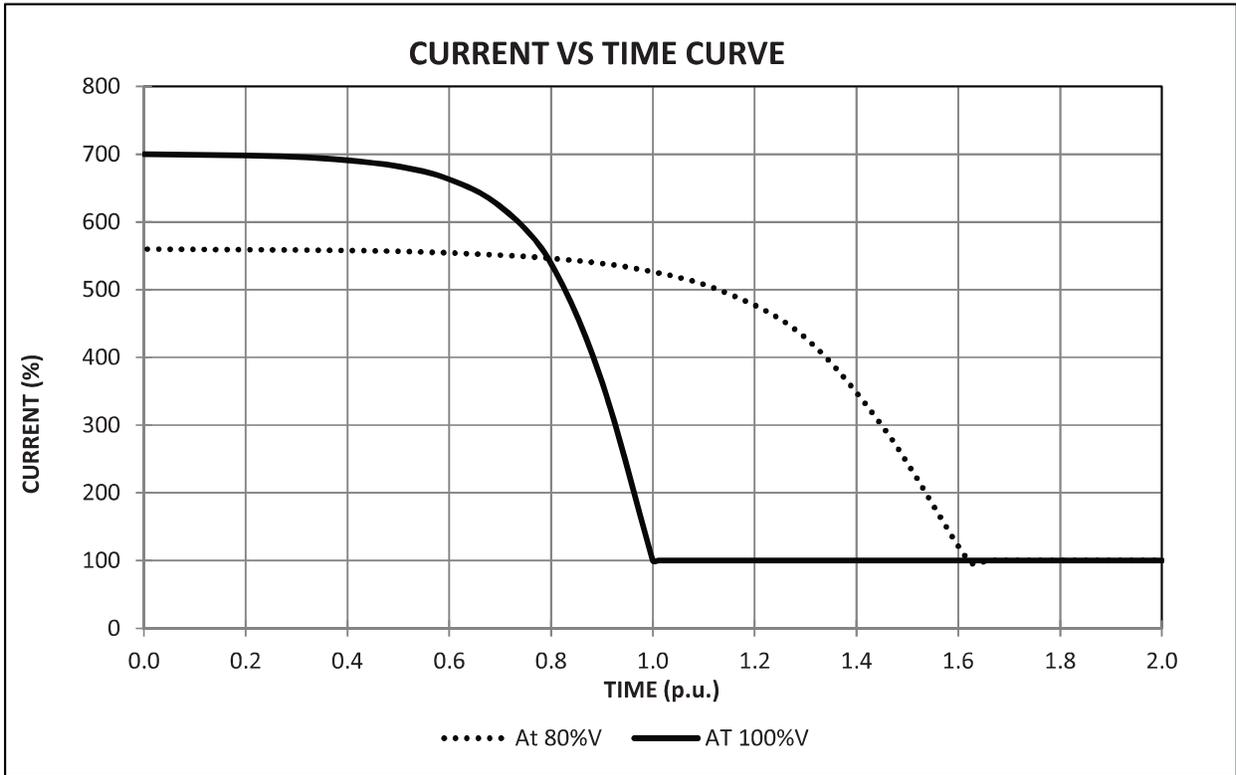
Revision:

-

Rated Output (kW/HP) : 2.2/3.0

Poles : 4

Efficiency Class : IE3

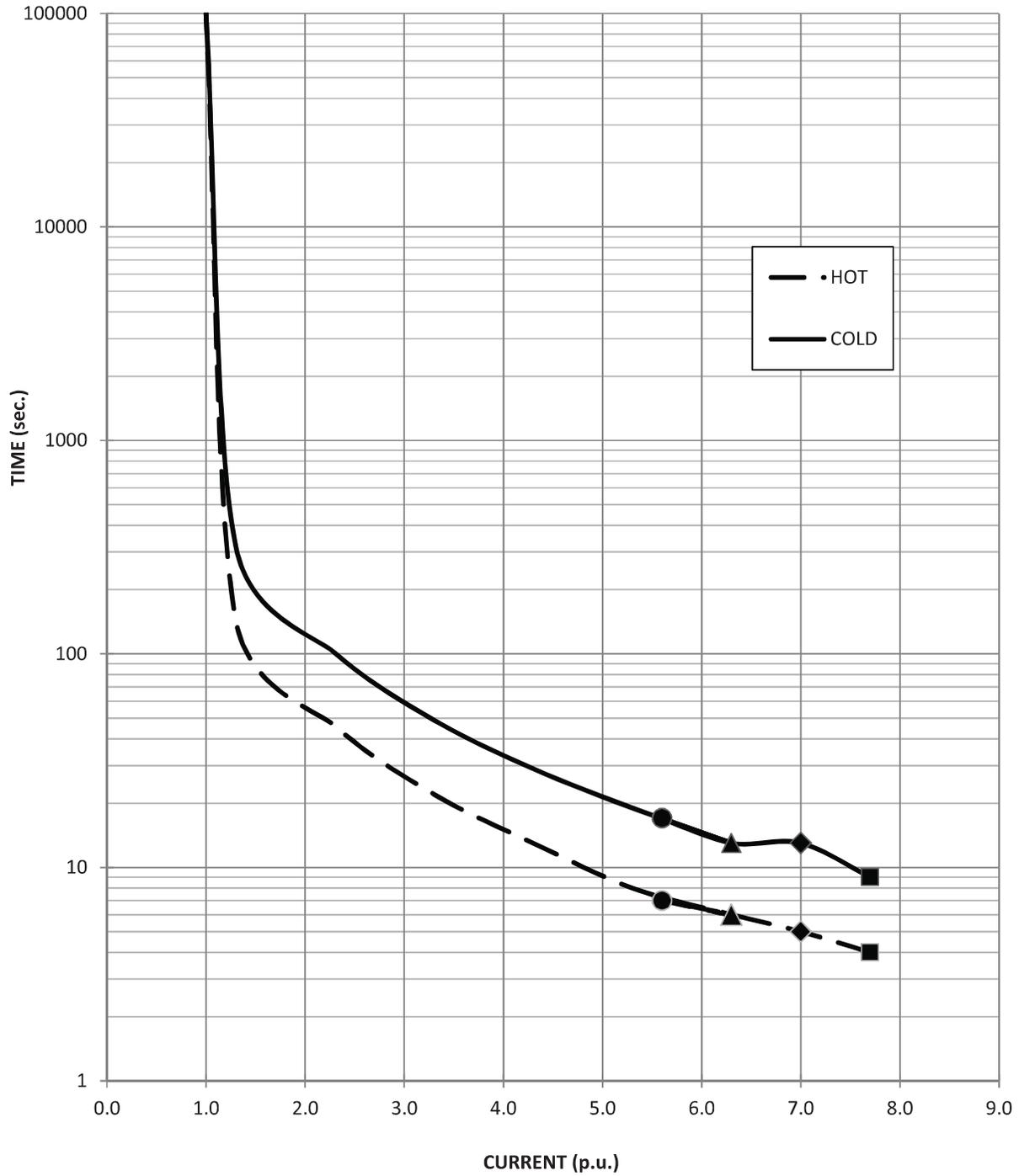


Rated Output (kW/HP) : 2.2/3.0

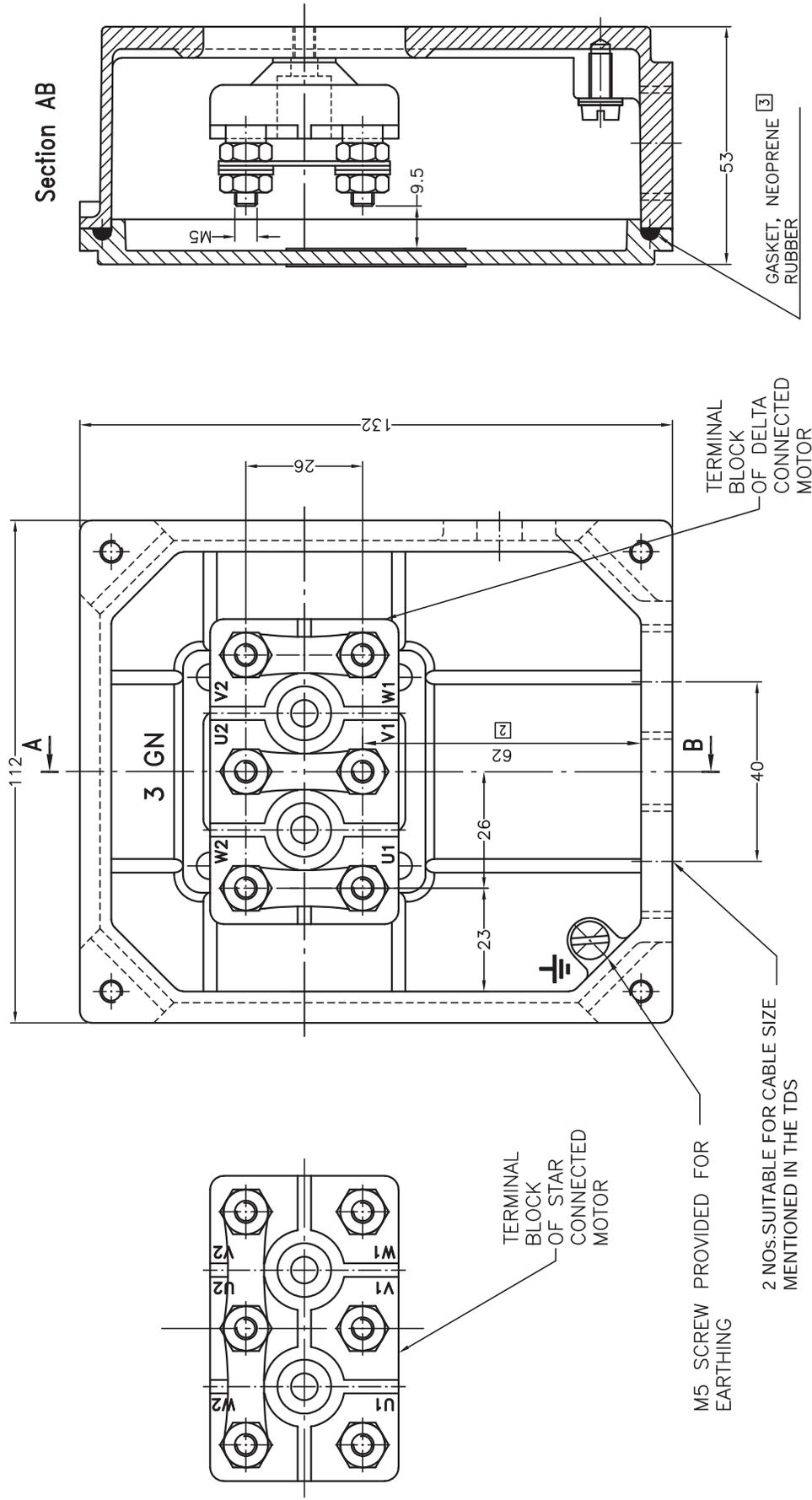
Poles : 4

Efficiency Class : IE3

THERMAL WITHSTAND CURVE



■ At 110%V ◆ At 100%V ▲ At 90%V ● At 80%V



REV. STATUS	3	GASKET INDICATED IN SECTION AB	ARUN	07/12/16
	2	DIM. 62 SPECIFIED, STANDARD ADDED IN TITLE	P.M. RAJESH	21/02/15
	1	DRAWING REDRAWN ON NEW CAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.	NIMKAR	05/07/13
		STANDARD TERMINAL BOX ASSEMBLY		
DRN.	NAME	DATE	SCALE	NTS
CHD.	GAMESH	02/08/11	SHT	1/1
APPD.	S.P.JADIA	02/08/11	FRAME SIZE	100-132 (GN)
		REF. 10-13-TBOX-ASSLY		
Dim. without tolerance as per IS:2102 very coarse All dimensions in mm unless otherwise specified.		TITLE hindustan ELECTRIC MOTORS		
NO MACHINING ~ ROUGH MACHINING ▽ SMOOTH MACHINING ▽▽ FINE MACHINE/GRIND ▽▽▽ POLISH/HONE/LAP ▽▽▽▽		DRG. NO.: A3-100/132-33(GN)		
MACHINING SYMBOLS		REV. 3		



**DATA SHEET:
INDUCTION MOTOR**

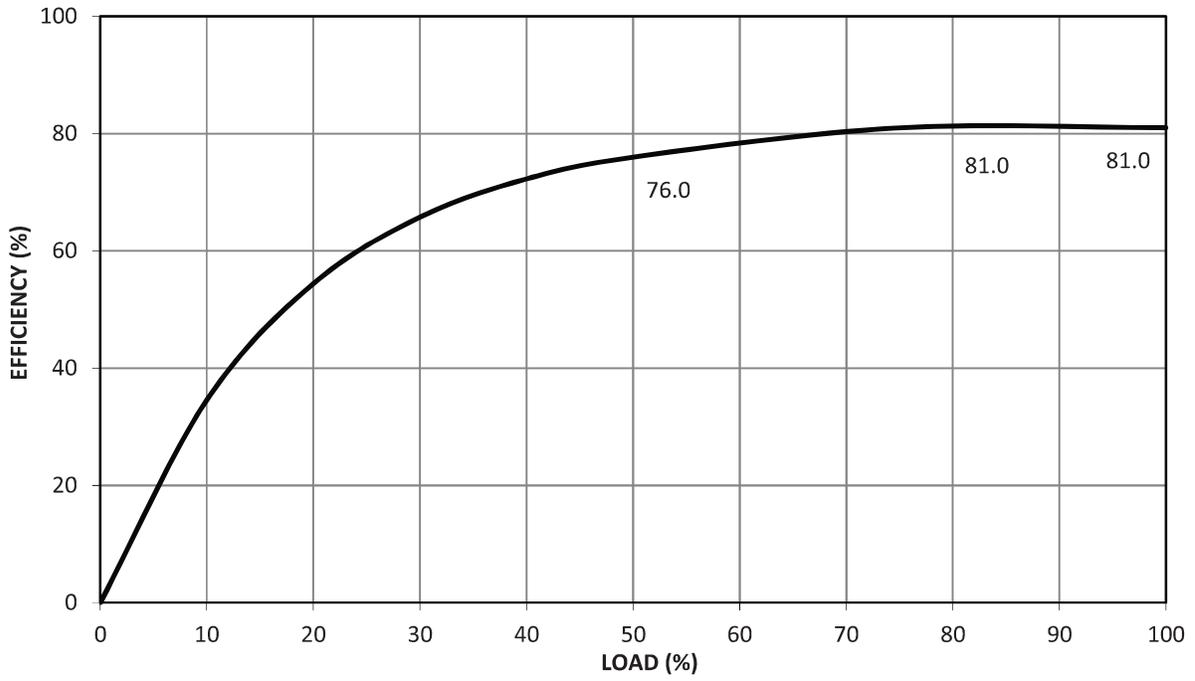
**Motor Type
2HE3 096-06**

Rated Output (kW/HP): 1.1/1.5

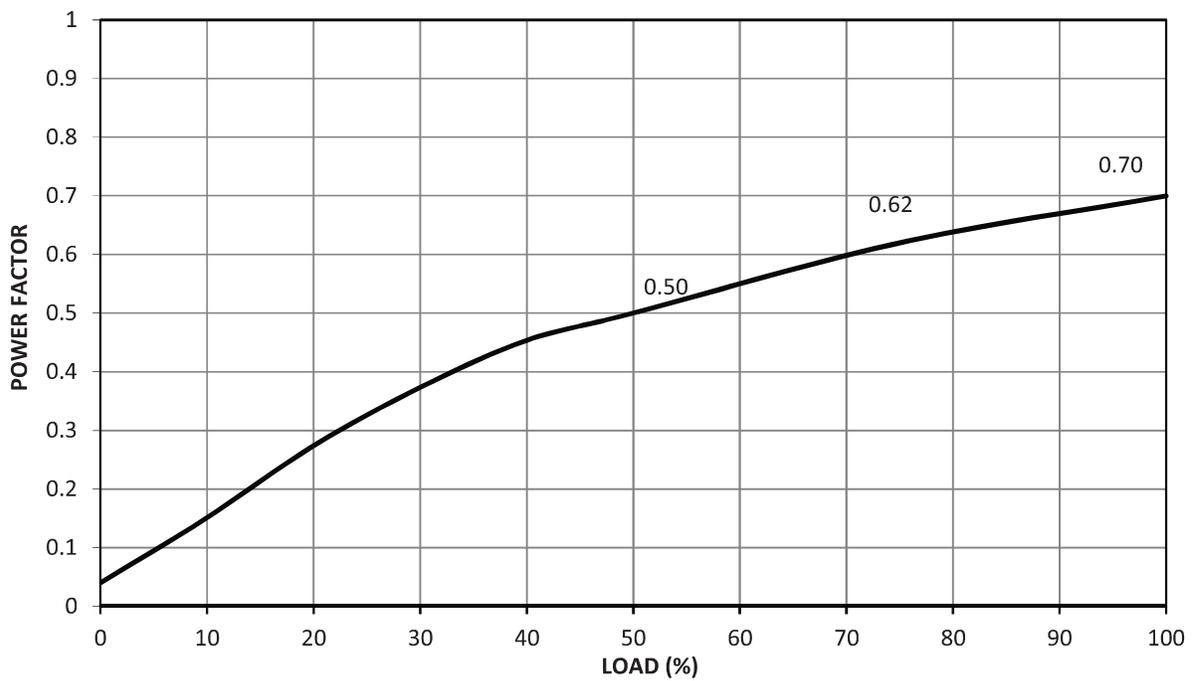
Poles: 6

Efficiency Class: IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

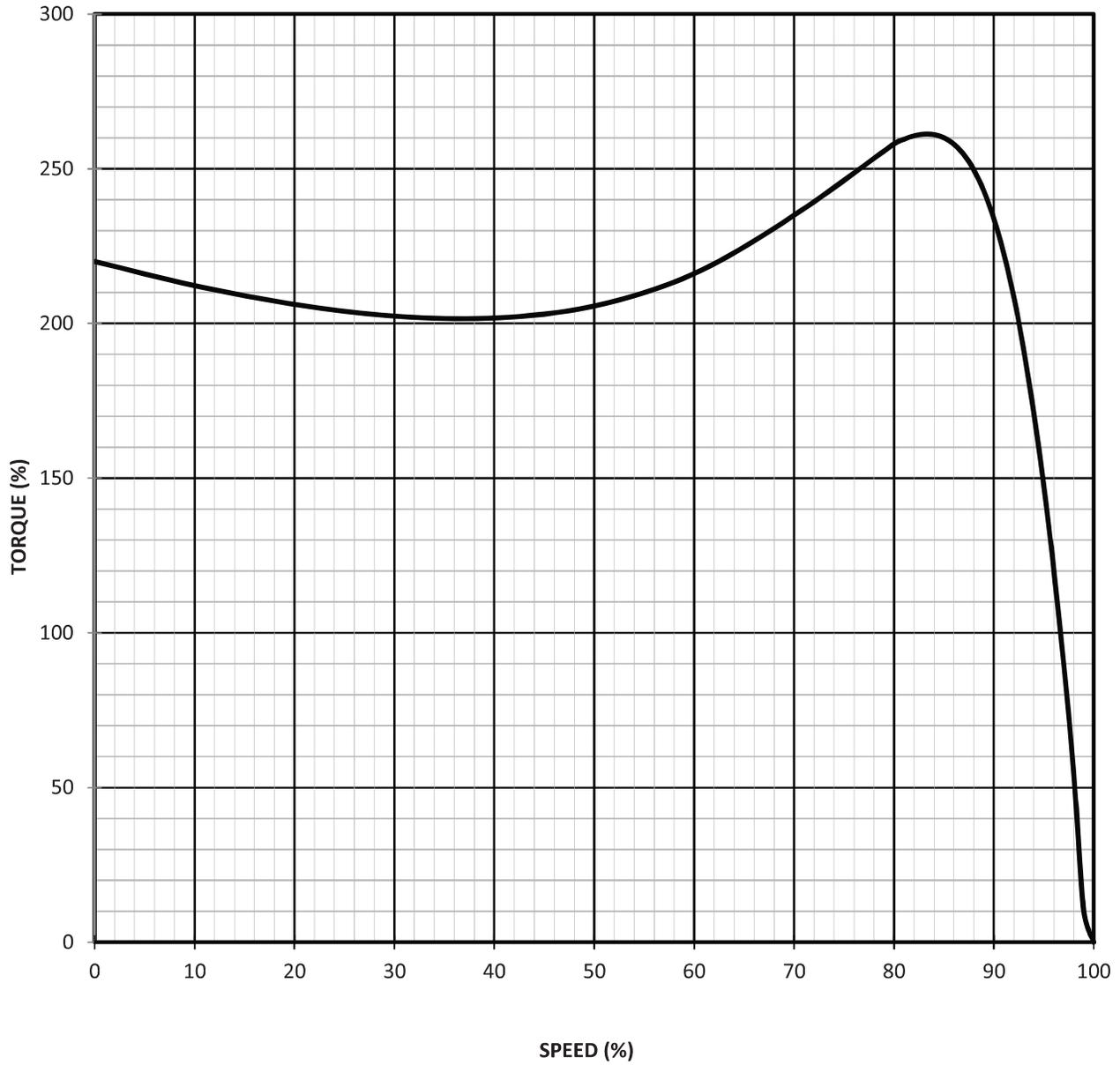


Rated Output (kW/HP) : 1.1/1.5

Poles : 6

Efficiency Class : IE3

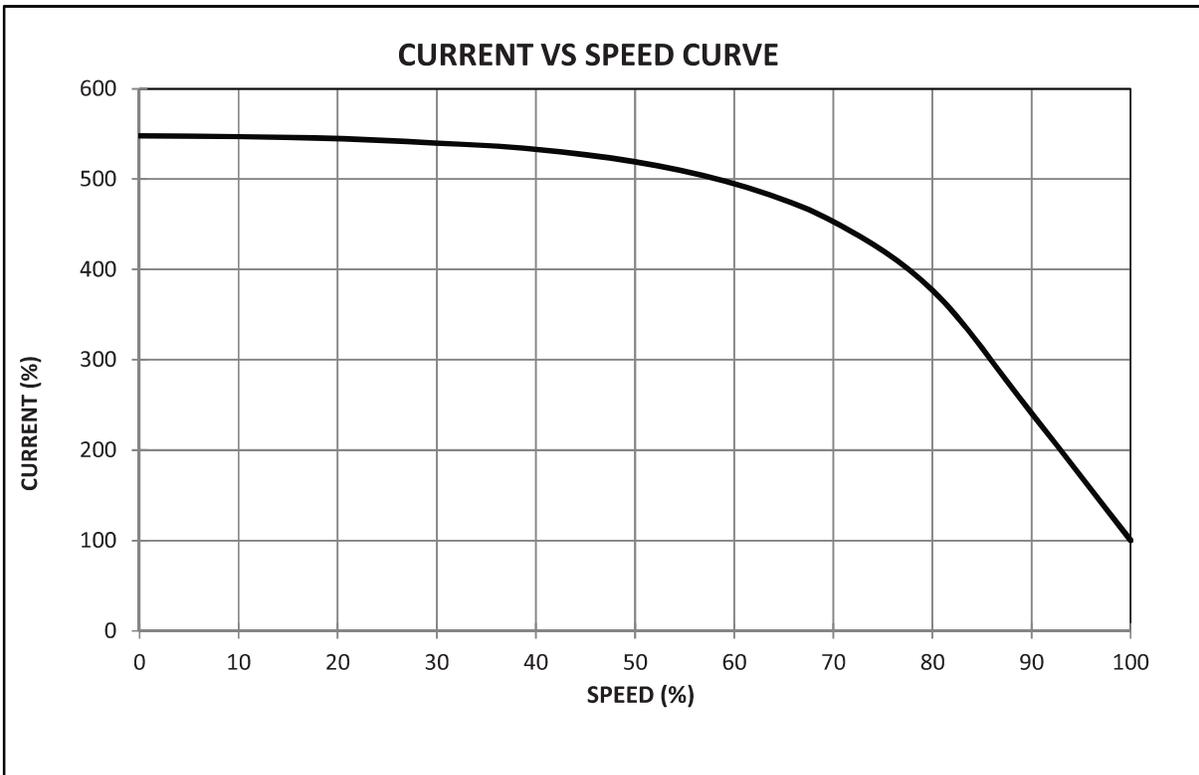
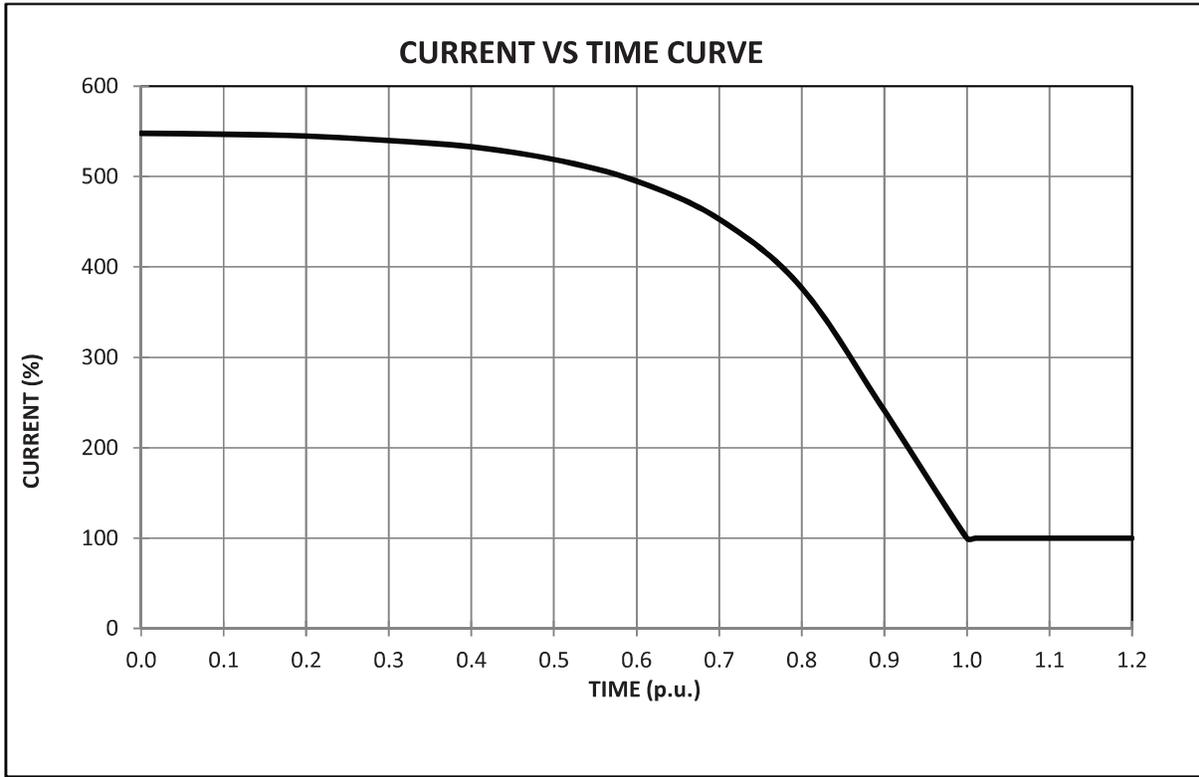
TORQUE SPEED CURVE



Rated Output (kW/HP): 1.1/1.5

Poles: 6

Efficiency Class: IE3

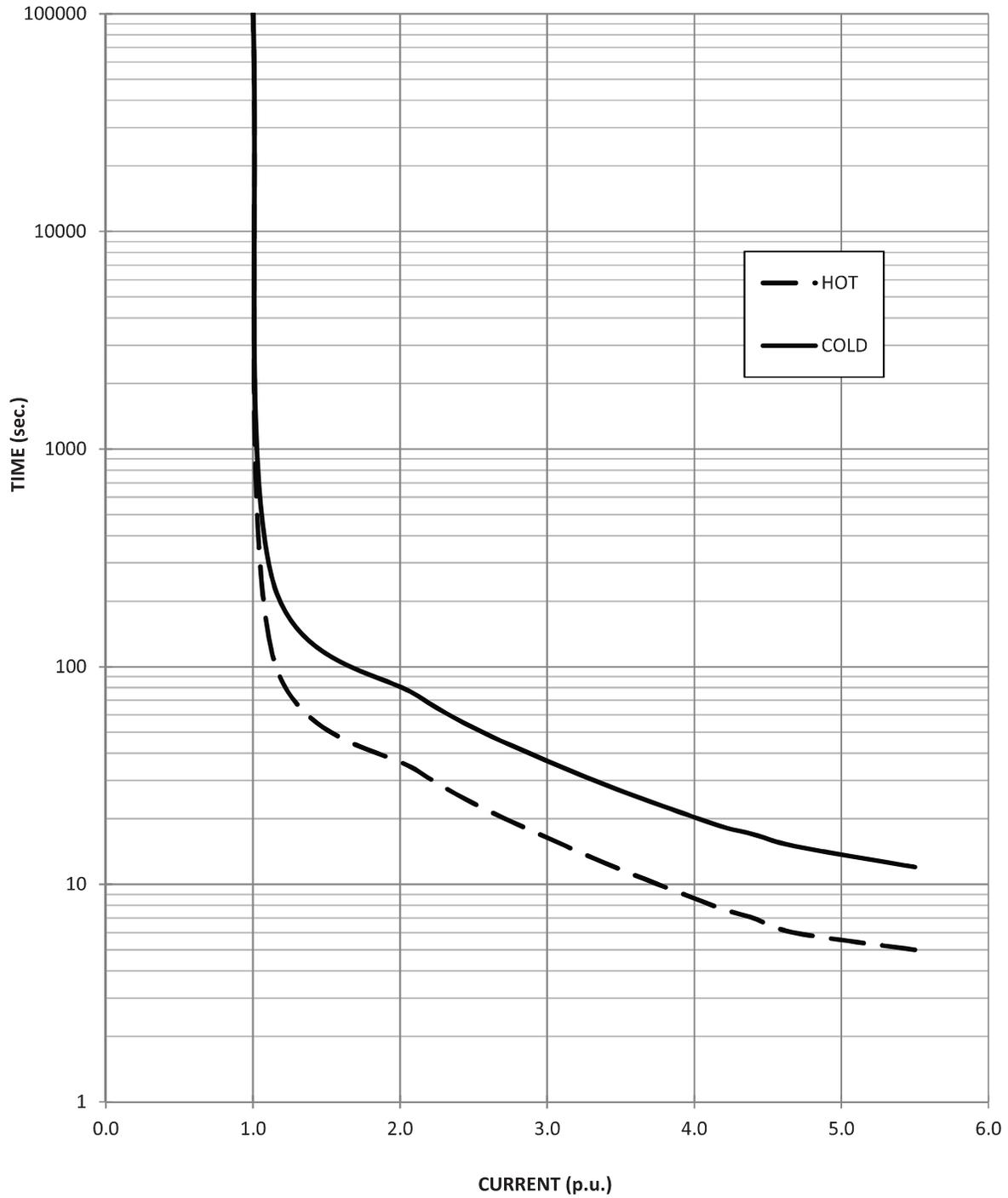


Rated Output (kW/HP) : 1.1/1.5

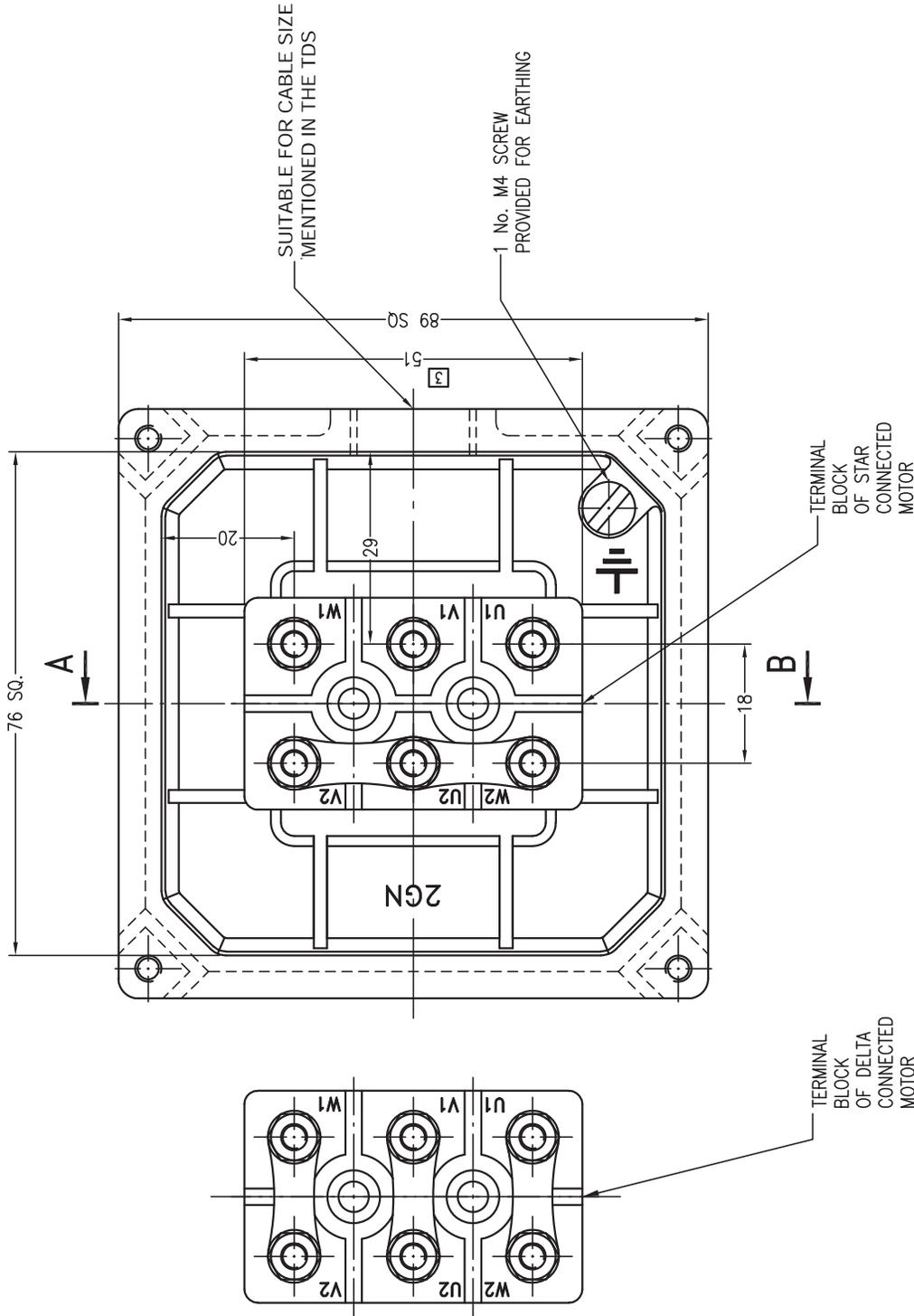
Poles : 6

Efficiency Class : IE3

THERMAL WITHSTAND CURVE

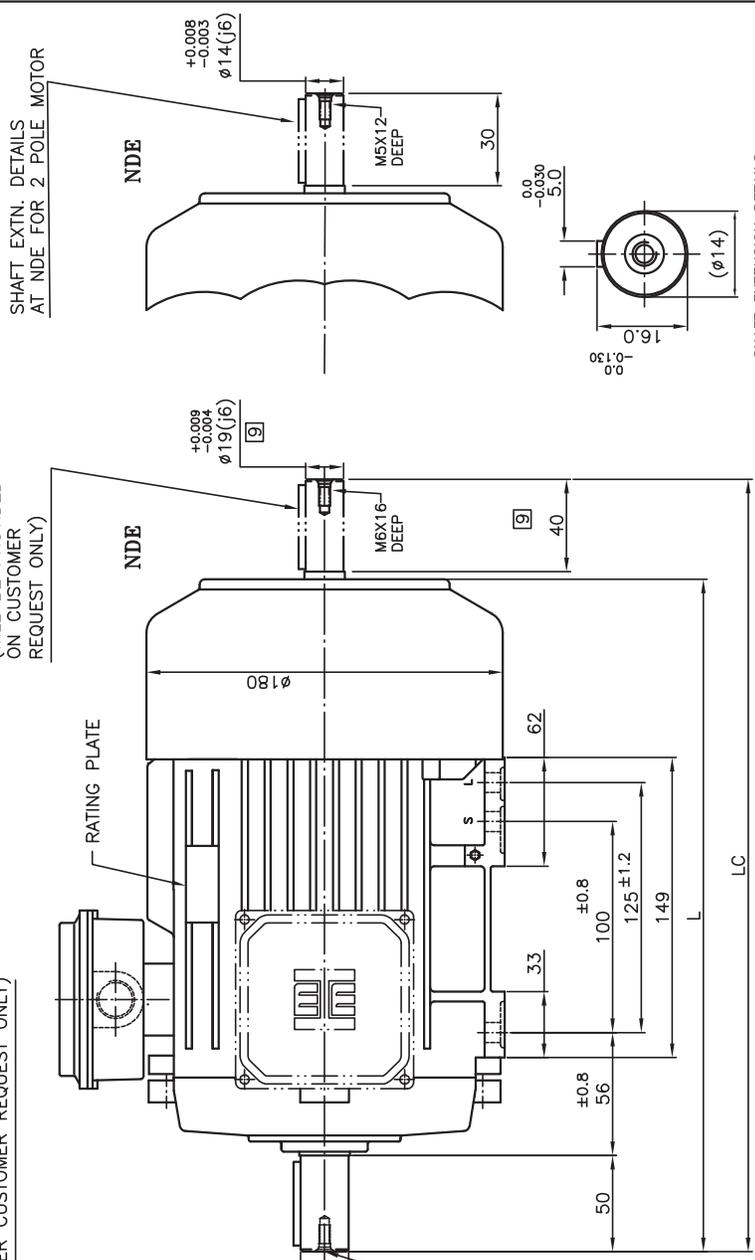


Section AB



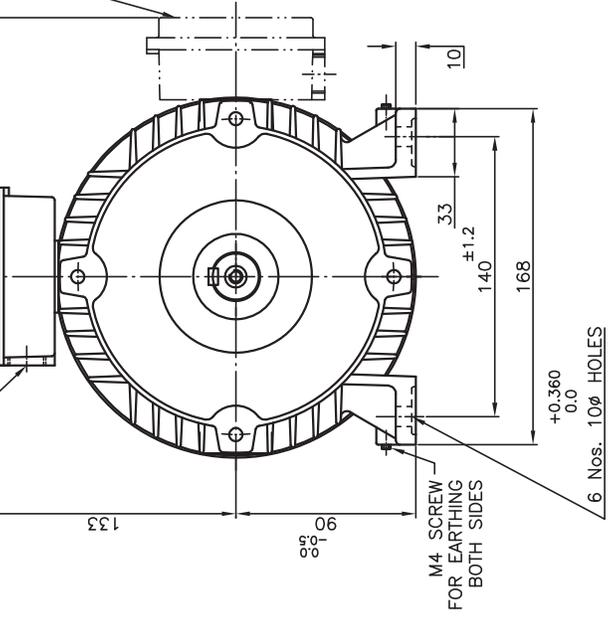
REV. STATUS	3	TERMINAL BLOCK DIMN. 51 WAS 68 LG. [TERMINAL BLOCK AS PER DRG. No. A4-56/100-17(3C) WAS
	2	TERMINAL BLOCK DRG. No. A4-56/090-17] DIMN. 29 REMOVED & DIMN. 6 WAS 6.5
	1	DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.
<p style="text-align: center;">hindustan ELECTRIC MOTORS</p>		
TITLE		
STD. TERMINAL BOX ASSEMBLY		
PROJECTION	DRG. NO.:	REV.
	A4-80/90-33(GN)	3
NAME	DATE	SCALE
GANESH	16-07-11	NTS
DRN.		SHT
CHD.		1/1
APPD.		FRAME SIZE
		63-90
		(GN)
		REF: TB-ASLY-63-90

Dim. without tolerance as per IS:2102 very coarse	NO MACHINING	~
All dimensions in mm unless otherwise specified.	ROUGH MACHINING	∇
	SMOOTH MACHINING	∇∇
	FINE MACHINE/GRIND	∇∇∇
	POLISH/HONE/LAP	∇∇∇∇
	MACHINING SYMBOLS	



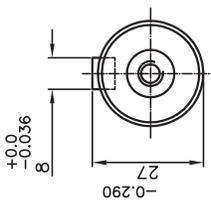
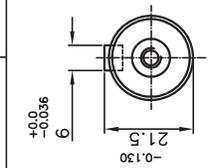
OPTIONAL LOCATION OF TERMINAL BOX ON RHS OR LHS WHEN VIEWING FROM DE. (AS PER CUSTOMER REQUEST ONLY)

SUITABLE FOR CABLE SIZE MENTIONED IN THE TDS

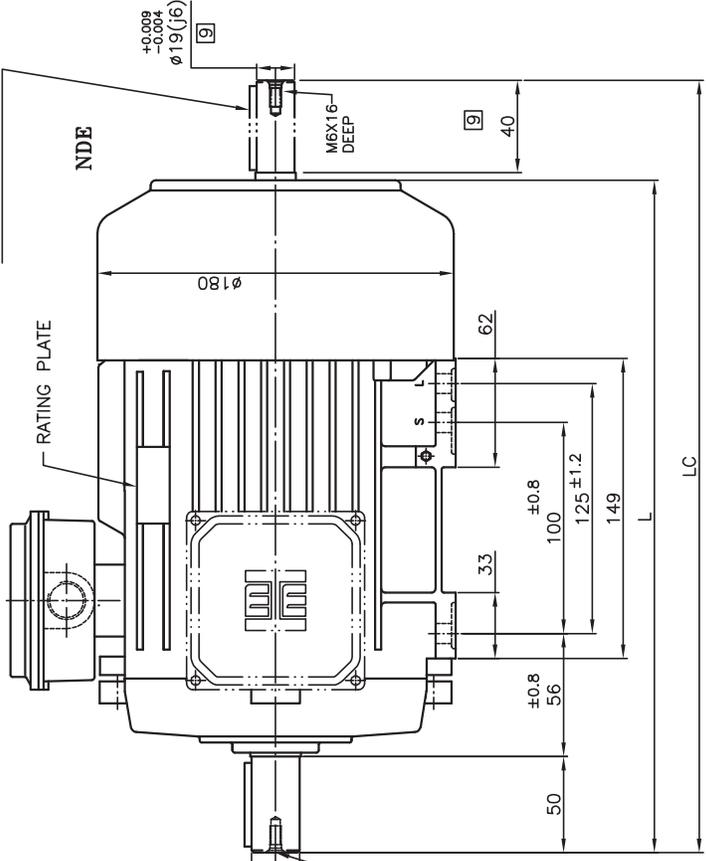


FRAME DESIGNATION	POLE	L	LC
90S	2	344	381
	4,6,8		391

FRAME DESIGNATION	POLE	L	LC
90L	2	344	381
	2	375	412
	4,8	344	391
	4,6,8	375	422



OPTIONAL SHAFT EXTENSION AT NDE (WILL BE PROVIDED ON CUSTOMER REQUEST ONLY)



SHAFT EXTENSION DETAILS AT NDE FOR 2POLE MOTOR

11

NOTE : THIS DRAWING SUPERSEDES DRG. No. A1-90S-49(GN)

11	L DIM 319 & LC 356, 366 REMOVED FROM 90S IN TABLE OF 90S AS PER MAIL RECD FROM CUSTOMER. CARE DT- 9-03-22/15-03-22 & NOTE ADDED	LANKESH	19-03-22
10	4 POLE ADDED IN 90L FRAME FOR TYPE DESIGNATION 2HE2 AS PER MAIL RECD FROM Mr. SANJAY JADIA DT. 21-06-21 & 4 POLE REMOVED FROM TYPE DESIGNATION- 2HE2 TABLE FOR MOTOR LENGTH L-375, LC- 422	ARUN	14-09-21
9	NDE SIDE SHAFT EXTN. DIA:19x40LG. WAS DIA:24x50LG. & DIMS 391 WAS 401 AS PER VERBAL INSTRUCTIONS RECD. FROM Mr. SANJAY JADIA CONSIDERING TO PROPOSED MECHANICAL DIMS. CHART - IE2 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE & 2 POLE MOTOR VIEW ADDED	LANKESH	23-09-19
8	TYPE DESIGNATION TABLE ADDED TO UPLOAD THIS DRG. ON PORTAL	ARUN	30-10-18
7	DRAWING REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. AND ALL THE FEATURES.	NIMKAR	24-1-14

Dim. without tolerance as per IS:2102, very coarse unless otherwise specified.

NO MACHINING	ROUGH MACHINING	SMOOTH MACHINING	FINE MACHINE/GRIND	POLISH/HONE/LAP
~	∇	∇∇	∇∇∇	∇∇∇∇



OVERALL DIMENSIONS DRAWING
B3/TEFC STD. MOTOR

DRN.	P.V.SHINDE	DATE	28-02-04
CHD.	S.P.JADIA	APPD.	28-02-04
DRG. NO.:	A1-90L-49(GN)		
PROJECTION			
SCALE	NTS	SHT	1/1
FRAME SIZE	90S/L (GN)		
REV.	11	REF.	90SL-OADM-B3

SHAFT EXTENSION DETAILS AT DE

SHAFT EXTENSION DETAILS AT NDE



DATA SHEET:
INDUCTION MOTOR

Motor Type
2HE3 080-02

No. of Phases		3	Reference Standard	IS:12615		
Frame Designation		80	Protection IS:4691	IP 55		
Rated Output	kW	0.75	Vibration Standard	IS:12075		
	HP	1.0	Noise Standard	IS:12065		
No. of Poles		2	Duty	S1		
Rated Voltage	V	415	Insulation Class	F		
Rated Frequency	Hz	50	Cooling IS:6362	IC411		
Rated Current	A	1.6	Terminal Box Details	Type	HM2GN	
Rated Speed	rpm	2850		Terminal Size	M4	
Rated Torque	kgm	0.26		No. of Terminal	6	
Efficiency	Full load	%	80.7	Bearing Data	Max. cable size (Cu) mm ²	1x3Cx2.5
	3/4 load	%	80.7		DE	6204ZZ
	1/2 load	%	78.0		NDE	6204ZZ
Power factor	Full load		0.81	Lubrication	Prelubricated	
	3/4 load		0.76	Life L10 (Direct Coupled) hrs.	50,000	
	1/2 load		0.63	Regreasing Time hrs.	-	
Max. Temp. Rise (Res.)	°C	70	Lifting Eyebolt	-		
Acceleration Time	sec.	-	Motor Weight (approx) kg	15.0		
Stator Connection		Y	Rotor GD ² kgm ²	0.0049		
Tropicalised? (Yes / No)		Yes	Ambient Temp. °C	50		
I _{st} / I _r		7.0	Overall Dimensions of Packed motor (LxBxH) (mm)			
T _{st} / T _r		2.5	-			
T _{po} / T _r		2.5	Voltage Variation ± %	10		
Locked rotor withstand time	Hot	sec.	6	Frequency Variation ± %	5	
	Cold	sec.	14	Combiend Variation ± %	10	

- Remarks: (1) Efficiency Class : IE3
(2) Motor Construction : TEFC
(3) Suitable Cable Gland & Lugs BY AVPL
(4) Minimum Starting Voltage : 80%
(5) Permissible Fault Level: 50KA for 0.25 sec
(6) No. of Hot/Cold Starts: 3/3

Data subject to tolerance as per IEC 60034-1

Prep.: Engg

Chkd.:

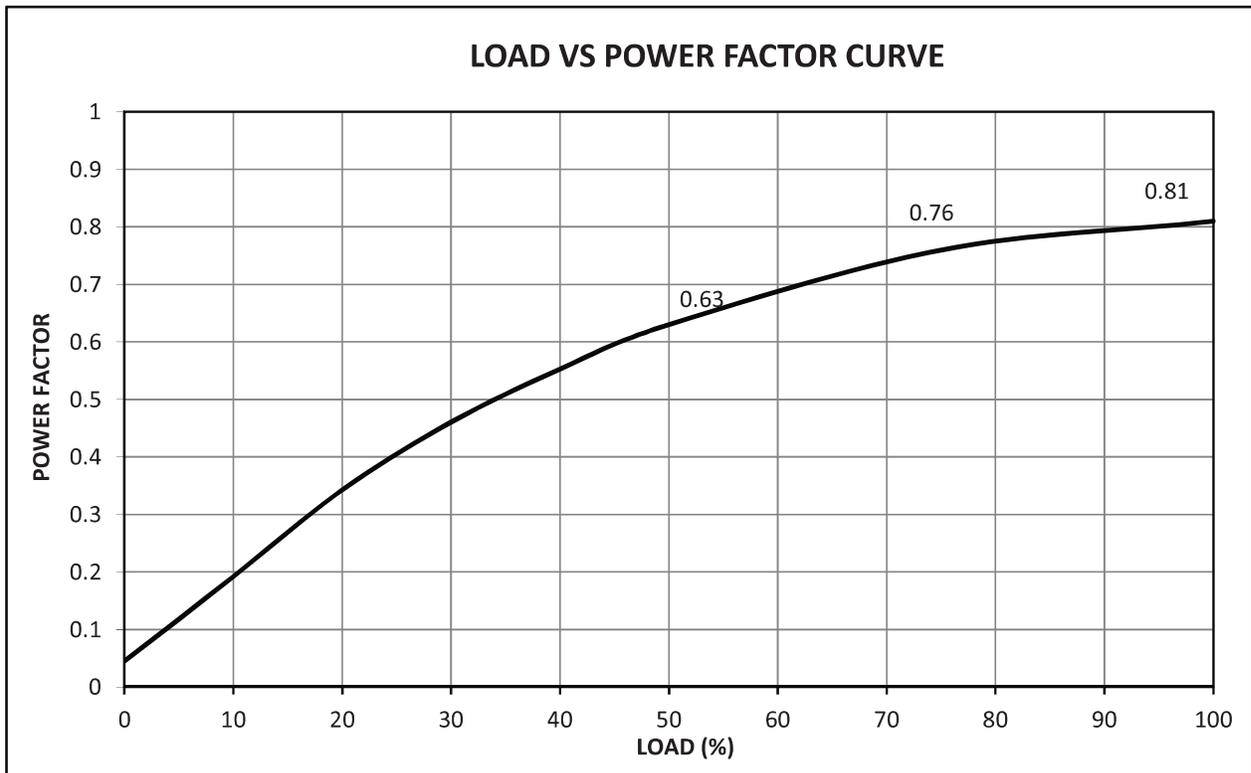
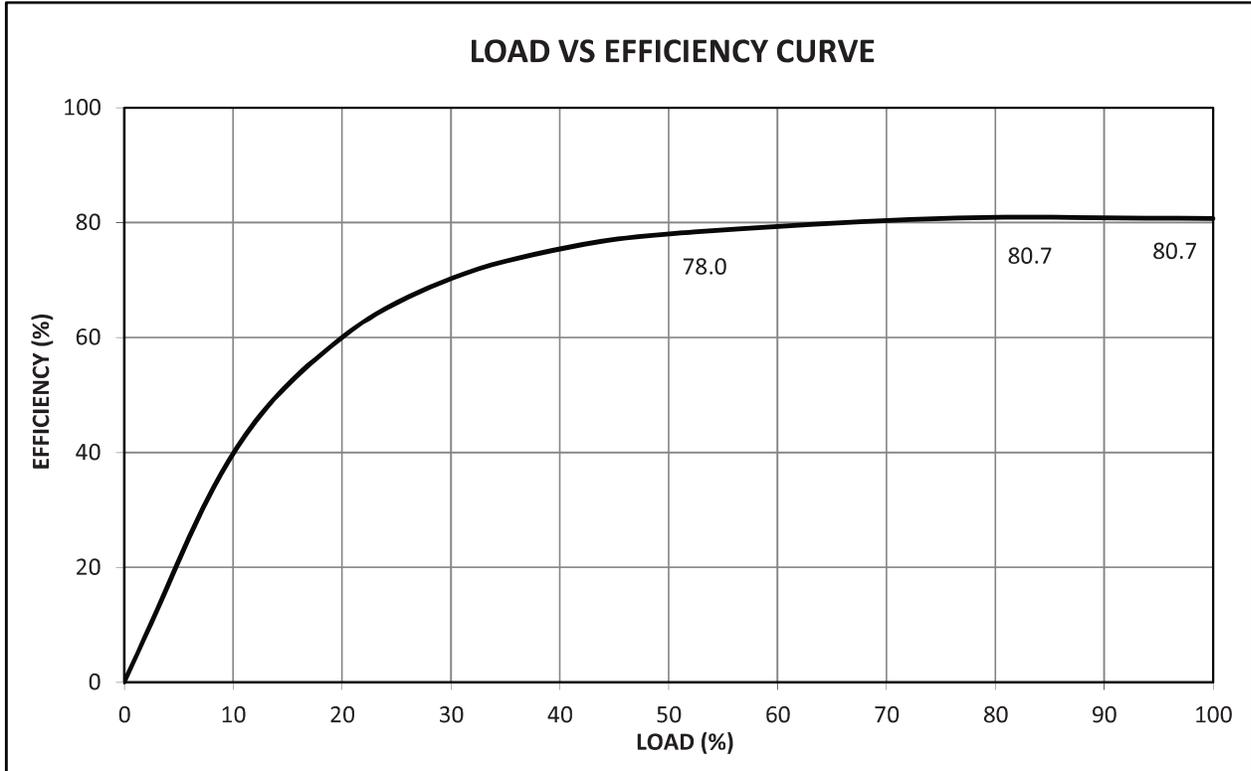
Date:

Date:

Rated Output (kW/HP) : 0.75/1.0

Poles : 2

Efficiency Class : IE3



Prep.:

SK

Date:

□□□□□□□□

Revision:

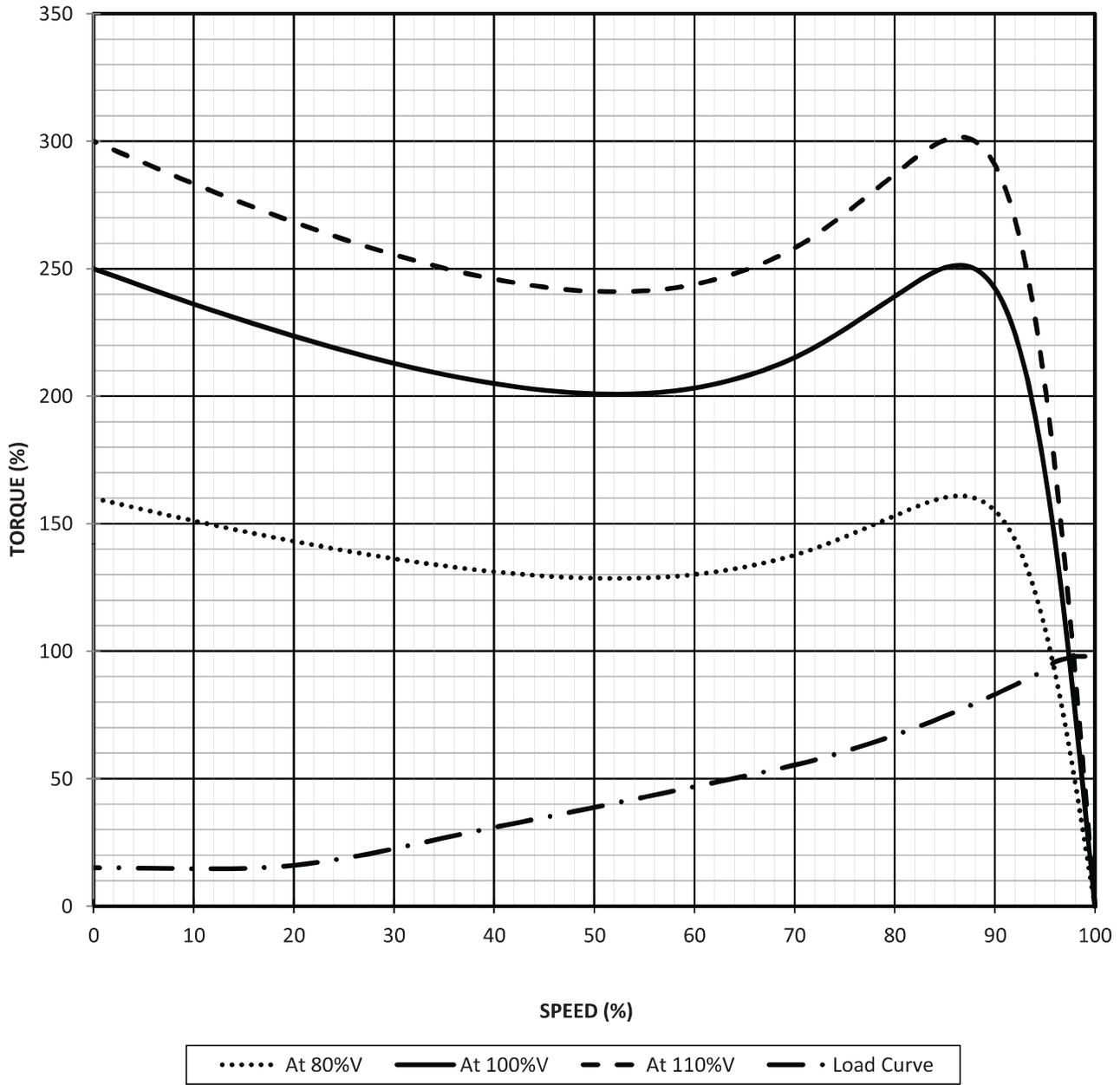
□

Rated Output (kW/HP) : 0.75/1.0

Poles : 2

Efficiency Class : IE3

TORQUE SPEED CURVE



Prep.:

SK

Date:

□□□□□□□□

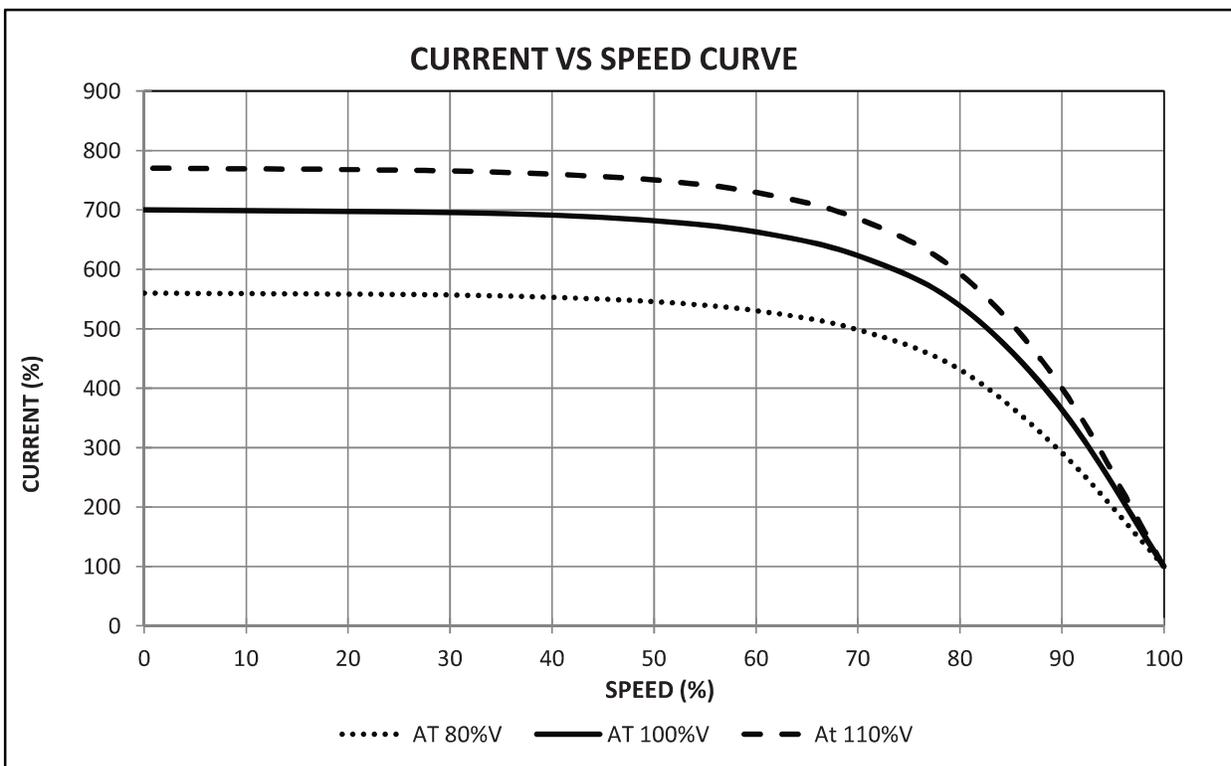
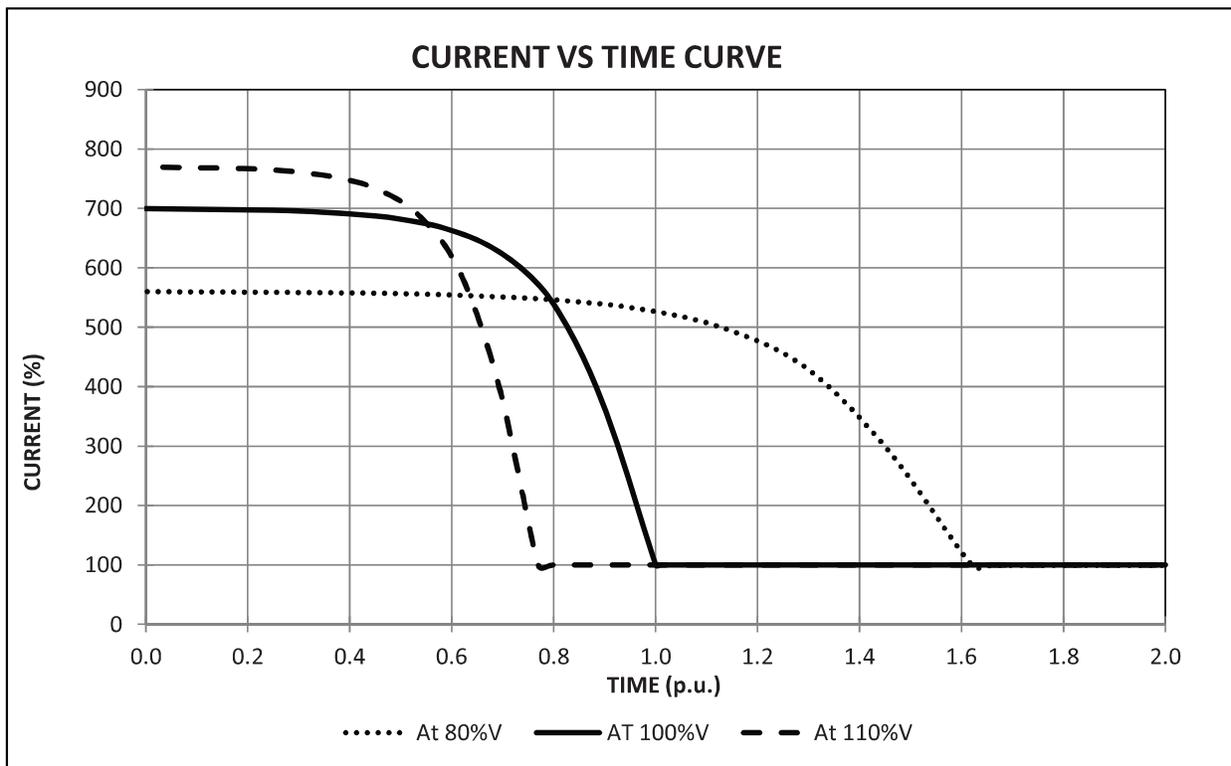
Revision:

□

Rated Output (kW/HP) : 0.75/1.0

Poles : 2

Efficiency Class : IE3

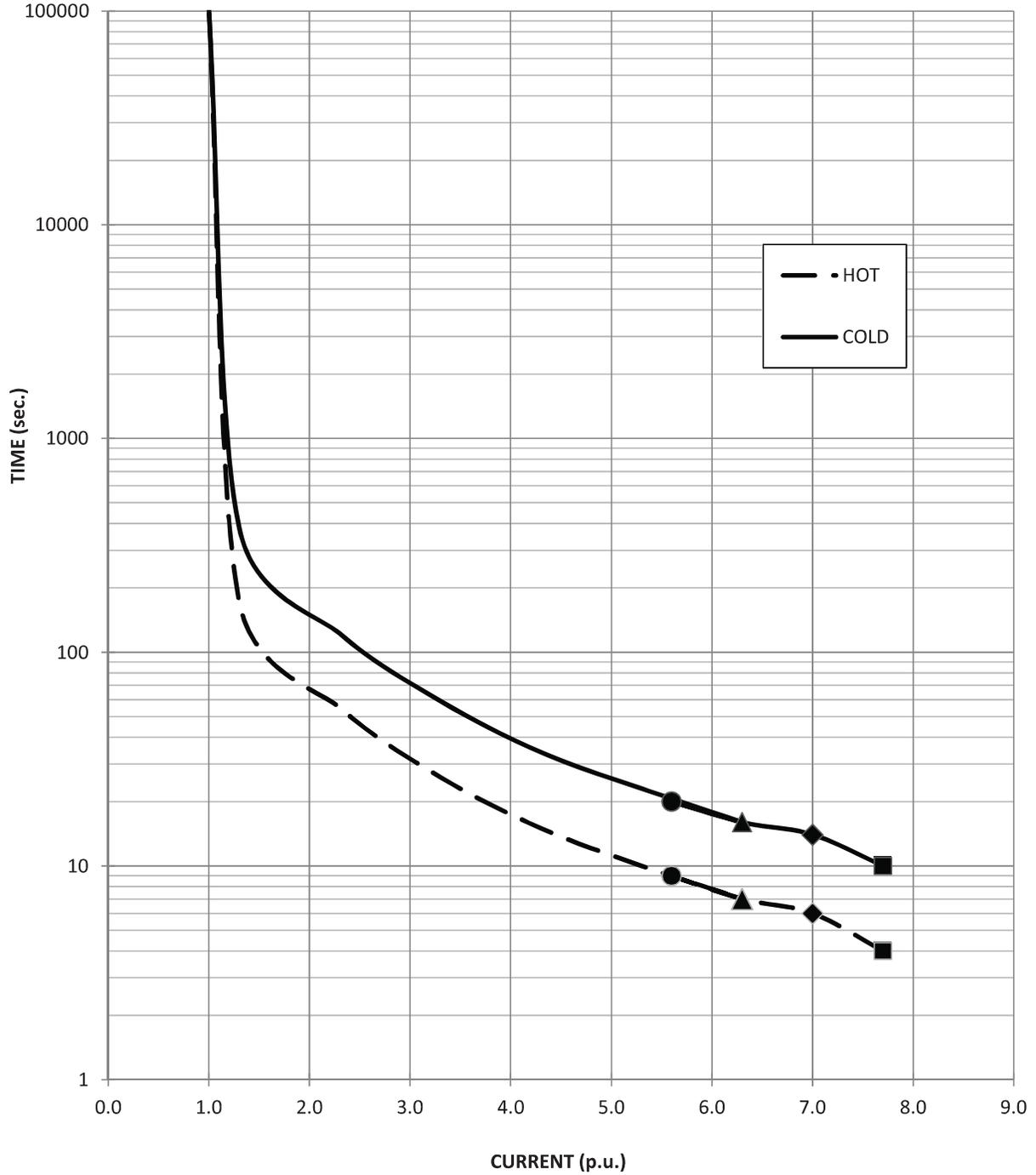


Rated Output (kW/HP) : 0.75/1.0

Poles : 2

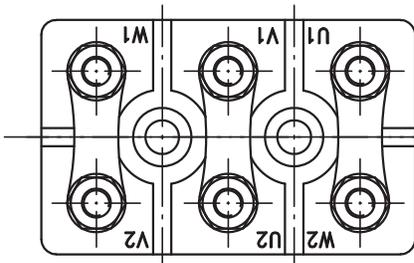
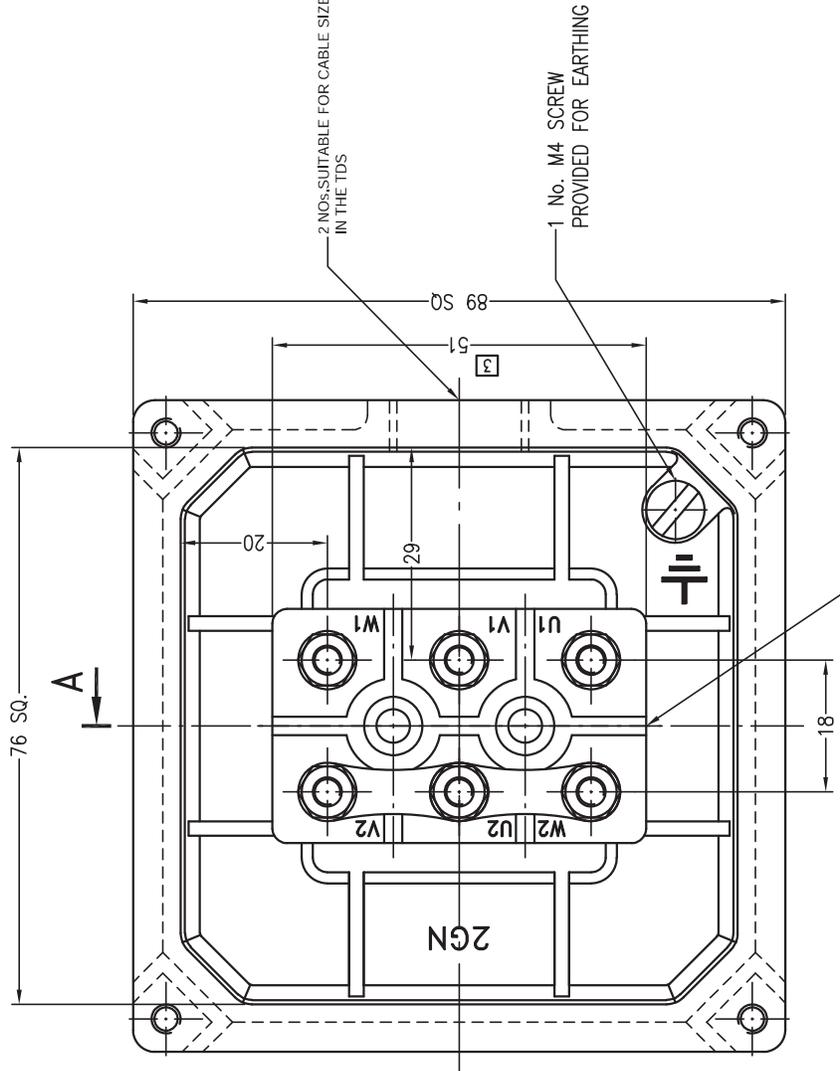
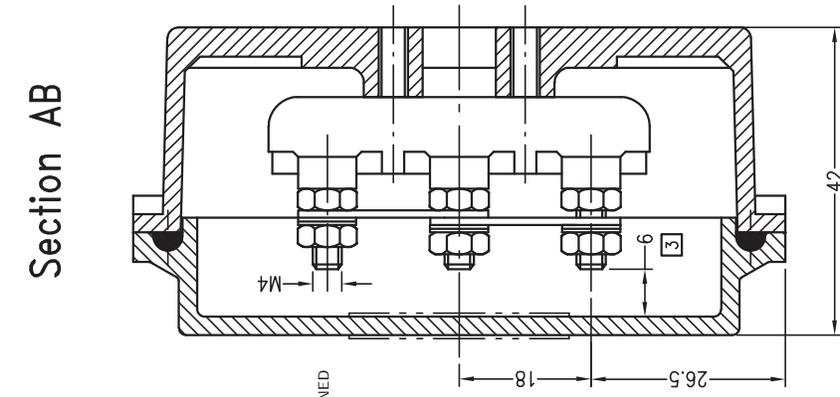
Efficiency Class : IE3

THERMAL WITHSTAND CURVE



At 110%V
 At 100%V
 At 90%V
 80%V

Section AB



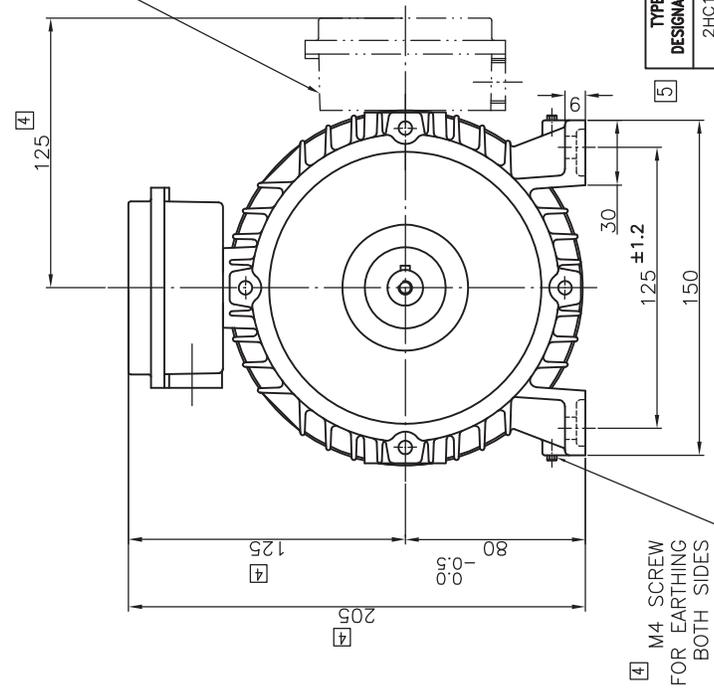
TERMINAL BLOCK OF DELTA CONNECTED MOTOR

TERMINAL BLOCK OF STAR CONNECTED MOTOR

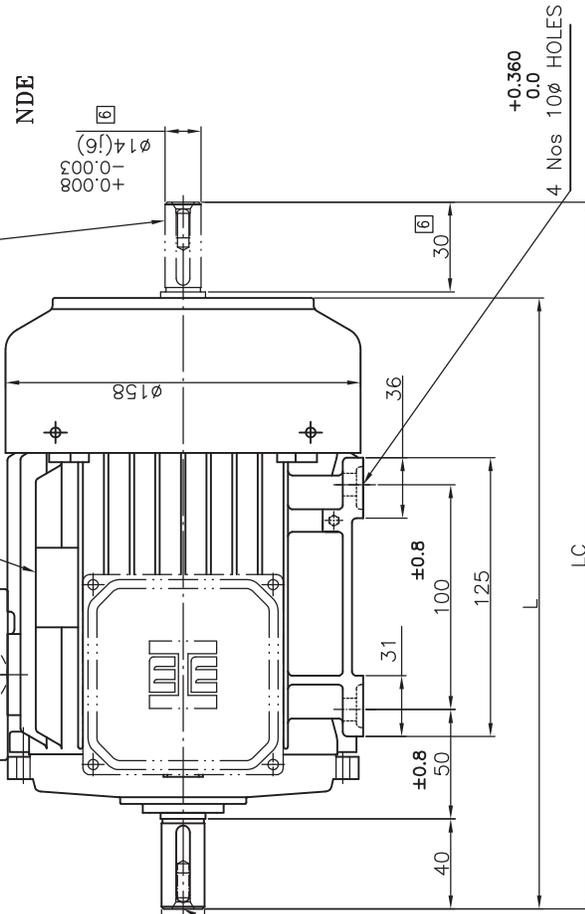
REV. STATUS	3	TERMINAL BLOCK DIMN. 51 WAS 68 LG. [TERMINAL BLOCK AS PER DRG. No. A4-56/100-17(3C) WAS
	2	TERMINAL BLOCK DRG. No. A4-56/090-17] DIMN. 29 REMOVED & DIMN. 6 WAS 6.5
	1	DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.
<p>hindustan ELECTRIC MOTORS</p>		
TITLE		
STD. TERMINAL BOX ASSEMBLY		
PROJECTION	DRG. NO.:	REV.
	A4-80/90-33(GN)	3
NAME	DATE	SCALE
GANESH	16-07-11	NTS
DRN.		SHT
CHD.		1/1
APPD.		FRAME SIZE
		63-90
		(GN)
		REF: TB-ASLY-63-90

Dim. without tolerance as per IS:2102 very coarse	~
All dimensions in mm unless otherwise specified.	
NO MACHINING	~
ROUGH MACHINING	∇
SMOOTH MACHINING	∇∇
FINE MACHINING/GRIND	∇∇∇
POLISH/HONE/LAP	∇∇∇∇
MACHINING SYMBOLS	

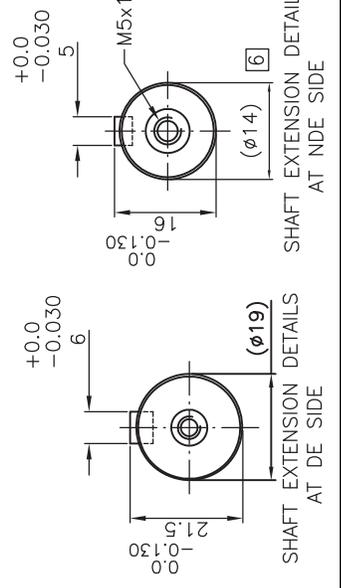
OPTIONAL LOCATION OF TERMINAL BOX ON RHS OR LHS WHEN VIEWING FROM DE (AS PER CUSTOMER REQUEST ONLY)



OPTIONAL SHAFT EXTENSION AT NDE (WILL BE PROVIDED ON CUSTOMER REQUEST ONLY)



TYPE DESIGNATION	POLE	HP	L	LC
2HC1	4,6,8	-	285	319
2HE2	2,4,6	-	285	319
	4	1	325	359
2HE3	2	1		
	4	0.75	285	329
	6	0.50		
2HS1	2	1.5	325	359
	4	1		
2HS5	4/2	-	285	319
	8/4	-		
	6/4	-		
2HT1	4,8	-		



SYM	REVISIONS	BY	DATE
6	NDE SIDE SHAFT EXTN. DIA.14x30LG. WAS DIA.19x40LG. & DIMS 319, 359 WAS 329, 369 AS PER VERBAL INSTRUCTIONS RECD. FROM MR. SANJAY JADIA CONSIDERING TO PROPOSED MECHANICAL DIMS. CHART - IE2 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE	ARUN	16-09-19
5	TABLE UPDATED, TYPE DESIGNATION WAS P.No & 2HC1, 2HE2, 2HE3, 2HS5, 2HT1 WAS P.No. 2 & DIMS 302, 346 REMOVED FROM TABLE & ADDED. 325, 369 DIMS IN TABLE & DIMS 285, 329 WAS 282, 326, TO UPLOAD THIS DRG. ON PORTAL	ARUN	23-11-18
4	DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES & DIMS.302,282,125,205,WAS 301,281,122 ,202 & EARTHING SCREW SIZE M4 WAS M5, P.No.1.2 WAS EFFICIENCY EFF1, EFF2 & RATING PLATE ADDED	ARUN	12-12-16

NO MACHINING	ROUGH MACHINING	SMOOTH MACHINING	FINE MACHINE/GRIND	POLES/ROSE/JAP	MACHINING SYMBOLS

Dim. without tolerance as per IS:2102, very coarse
All dimensions in mm unless otherwise specified.

SHAFT EXTENSION DETAILS AT DE SIDE
SHAFT EXTENSION DETAILS AT NDE SIDE

hindustan ELECTRIC MOTORS

NAME: P.V.SHINDE
DRN. CHD. APPD. S.P.JADIA

DATE: 19/04/05
19/04/05
19/04/05

PROJECTION:

DRG. NO.: A1-80-49(GN)

REV. 6

SCALE: NTS

SHT: 1/1

FRAME SIZE: 80 (GN)

TITLE: OVERALL DIMENSION DRAWING
STD./TEFC/B3 MOUNTED MOTOR

REF.: A1-80-0ADIMNS-B3

No. of Phases		3	Reference Standard		IS:12615		
Frame Designation		80	Protection IS:4691		IP 55		
Rated Output	kW	1.1	Vibration Standard		IS:12075		
	HP	1.5	Noise Standard		IS:12065		
No. of Poles		2	Duty		S1		
Rated Voltage		V	415	Insulation Class		F	
Rated Frequency		Hz	50	Cooling IS:6362		IC411	
Rated Current		A	2.2	Terminal Box Details	Type	HM2GN	
Rated Speed		rpm	2850		Terminal Size	M4	
Rated Torque		kgm	0.38		No. of Terminal	6	
Efficiency	Full load	%	82.7		Max. cable size (Cu)	mm ²	1x3Cx2.5
	3/4 load	%	82.7	DE		6204ZZ	
	1/2 load	%	80.0	NDE		6204ZZ	
Power factor	Full load		0.84	Bearing Data	Lubrication	Prelubricated	
	3/4 load		0.80		Life L10 (Direct Coupled)	hrs.	50,000
	1/2 load		0.72		Regreasing Time	hrs.	-
Max. Temp. Rise (Res.)		°C	70		Lifting Eyebolt		-
Acceleration Time		sec.	-	Motor Weight (approx)		kg	17.0
Stator Connection			Y	Rotor GD ²		kgm ²	0.0062
Tropicalised? (Yes / No)			Yes	Ambient Temp.		°C	50
I _{st} / I _r			7.0	Overall Dimensions of Packed motor (LxBxH) (mm)			
T _{st} / T _r			2.6				
T _{po} / T _r			2.5	Voltage Variation ±		%	10
Locked rotor withstand time	Hot	sec.	6	Frequency Variation ±		%	5
	Cold	sec.	13	Combiend Variation ±		%	10

Remarks: (1) Efficiency Class : IE3
 (2) Motor Construction : TEFC
 (3) Suitable Cable Gland & Lugs BY AVPL
 (4) Minimum Starting Voltage : 80%
 (5) Permissible Fault Level: 50KA for 0.25 sec
 (6) No. of Hot/Cold Starts: 3/3

Data subject to tolerance as per IEC 60034-1

Prep.: Engg

Chkd.:

Date:

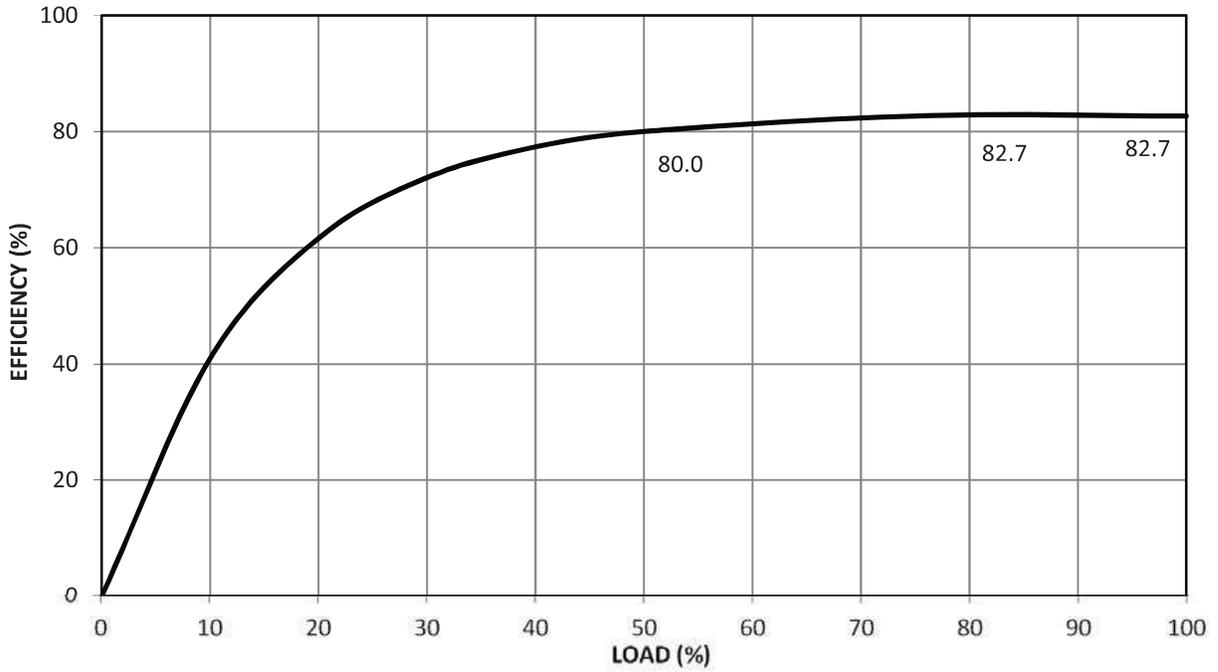
Date:

Rated Output (kW/HP) : 1.1/1.5

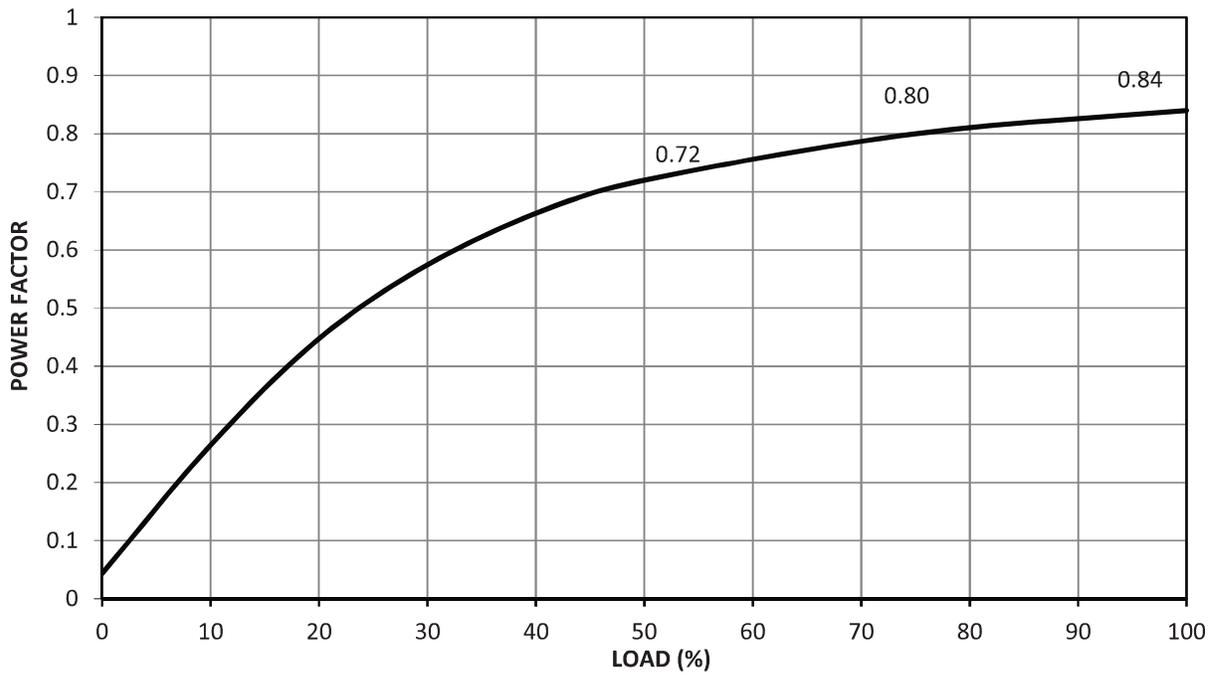
Poles : 2

Efficiency Class : IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE



Prep.:

SK

Date:

25-12-2021

Revision:

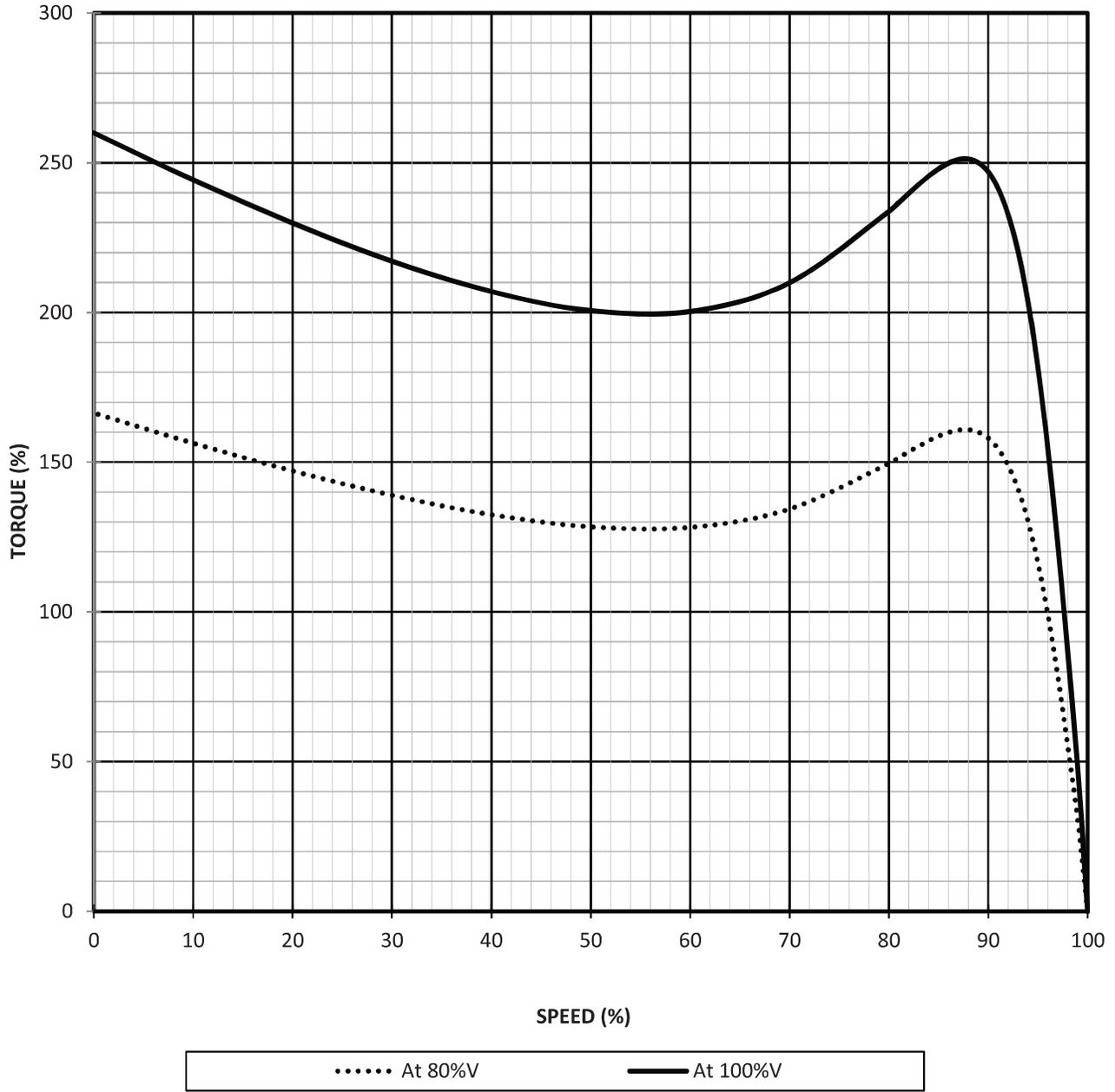
-

Rated Output (kW/HP): 1.1/1.5

Poles : 2

Efficiency Class : IE3

TORQUE SPEED CURVE



Prep.:

SK

Date:

25-12-2021

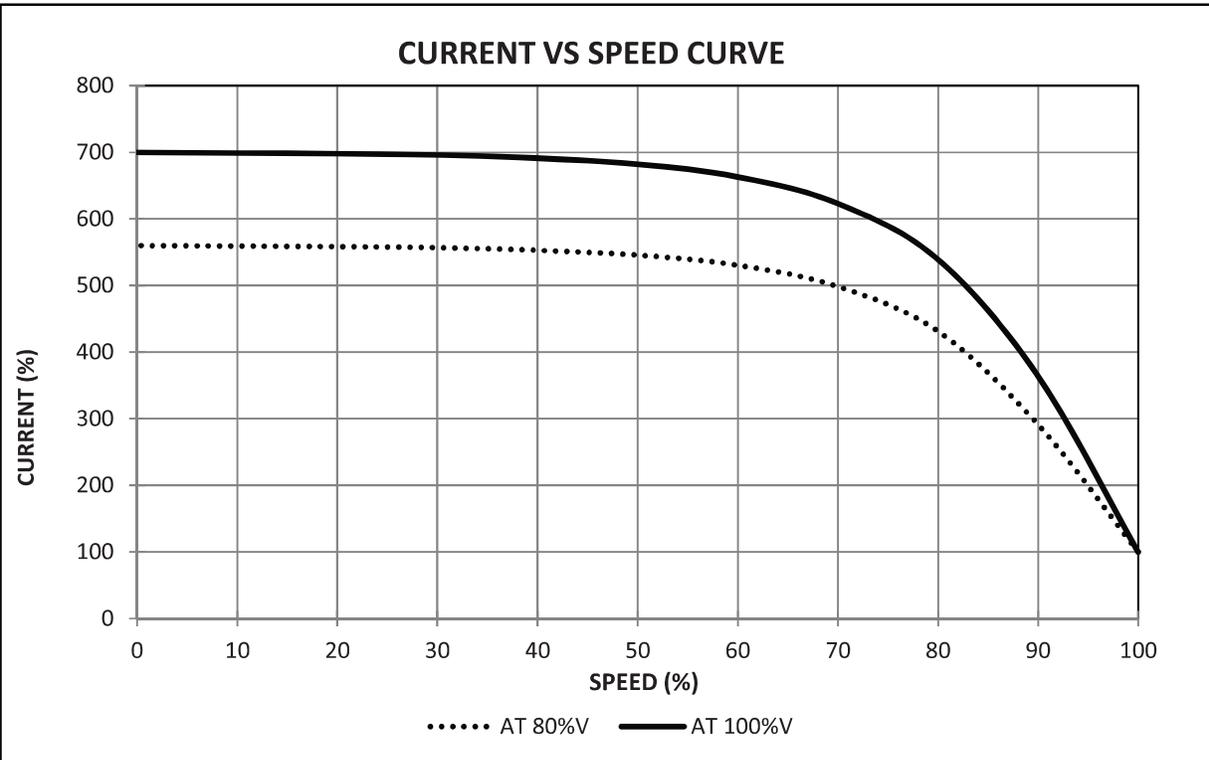
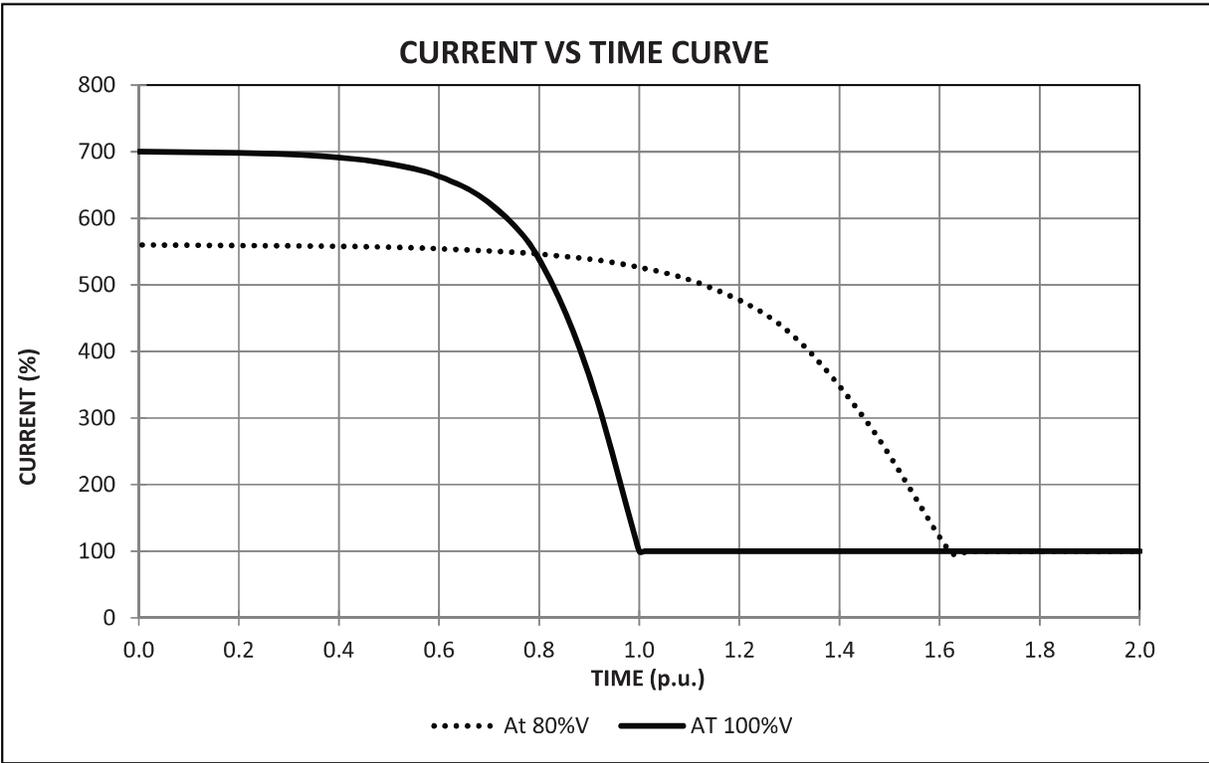
Revision:

-

Rated Output (kW/HP) : 1.1/1.5

Poles : 2

Efficiency Class : IE3

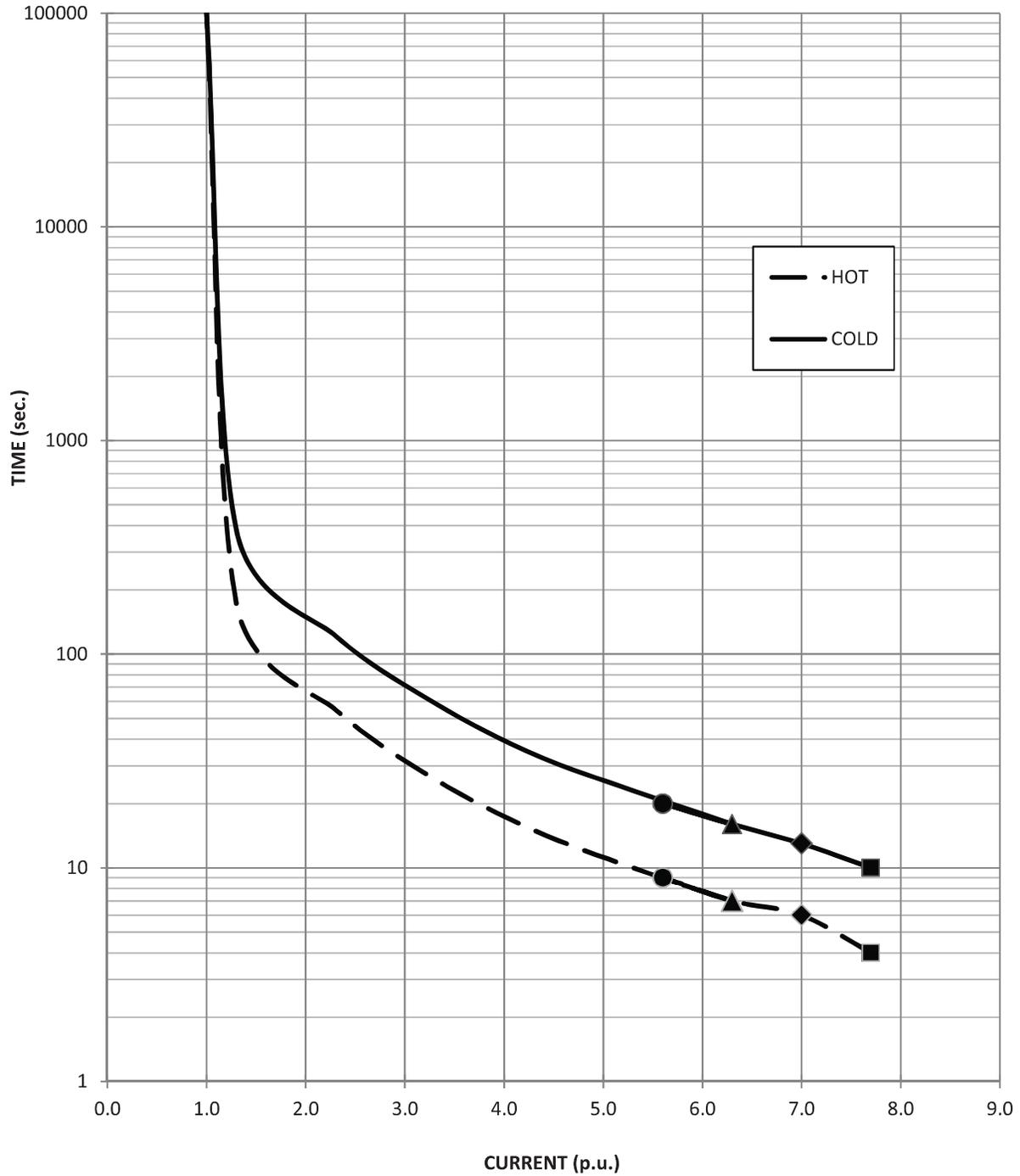


Rated Output (kW/HP) : 1.1/1.5

Poles : 2

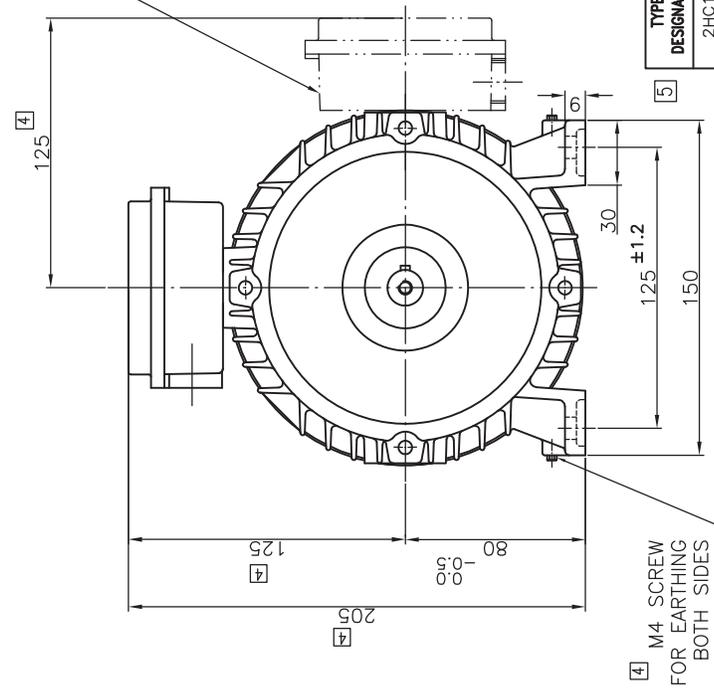
Efficiency Class : IE3

THERMAL WITHSTAND CURVE



■ At 110%V ◆ At 100%V ▲ At 90%V ● At 80%V

[4] OPTIONAL LOCATION OF TERMINAL BOX ON RHS OR LHS WHEN VIEWING FROM DE (AS PER CUSTOMER REQUEST ONLY)



[4] SUITABLE FOR CABLE SIZE MENTIONED IN THE TDS

[4] RATING PLATE

[4] OPTIONAL SHAFT EXTENSION AT NDE (WILL BE PROVIDED ON CUSTOMER REQUEST ONLY)

DE

Ø 19 (6)
+0.008
-0.003

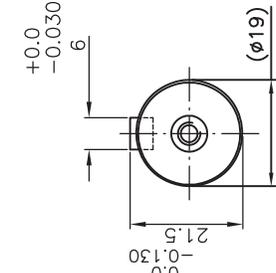
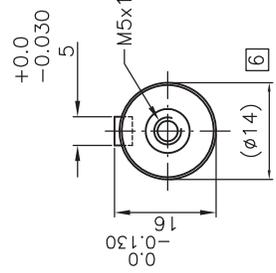
NDE

Ø 14 (6)
+0.008
-0.003

M6X16 DEEP

[4] M4 SCREW FOR EARTHING BOTH SIDES

TYPE DESIGNATION	POLE	HP	L	LC
2HC1	4,6,8	-	285	319
2HE2	2,4,6	-	285	319
	4	1	325	359
2HE3	2	1		
	4	0.75	285	329
	6	0.50		
2HS1	2	1.5	325	359
	4	1		
2HS5	4/2	-	285	319
	8/4	-		
	6/4	-		
2HT1	4,8	-		



SHAFT EXTENSION DETAILS AT DE SIDE

SHAFT EXTENSION DETAILS AT NDE SIDE

SYM	REVISIONS	BY	DATE
[6]	NDE SIDE SHAFT EXTN. DIA.14x30LG. WAS DIA.19x40LG. & DIMS 319, 359 WAS 329, 369 AS PER VERBAL INSTRUCTIONS RECD. FROM MR. SANJAY JADIA CONSIDERING TO PROPOSED MECHANICAL DIMS. CHART - IE2 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE	ARUN	16-09-19
[5]	TABLE UPDATED, TYPE DESIGNATION WAS P.No & 2HC1, 2HE2, 2HE3, 2HS5, 2HT1 WAS P.No 2 & DIMS 302, 346 REMOVED FROM TABLE & ADDED. 325, 369 DIMS IN TABLE & DIMS 285, 329 WAS 282, 326, TO UPLOAD THIS DRG. ON PORTAL	ARUN	23-11-18
[4]	DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES & DIMS.302,282,125,205,WAS 301,281,122 ,202 & EARTHING SCREW SIZE M4 WAS M5, P.No.1.2 WAS EFFICIENCY EFF1, EFF2 & RATING PLATE ADDED	ARUN	12-12-16

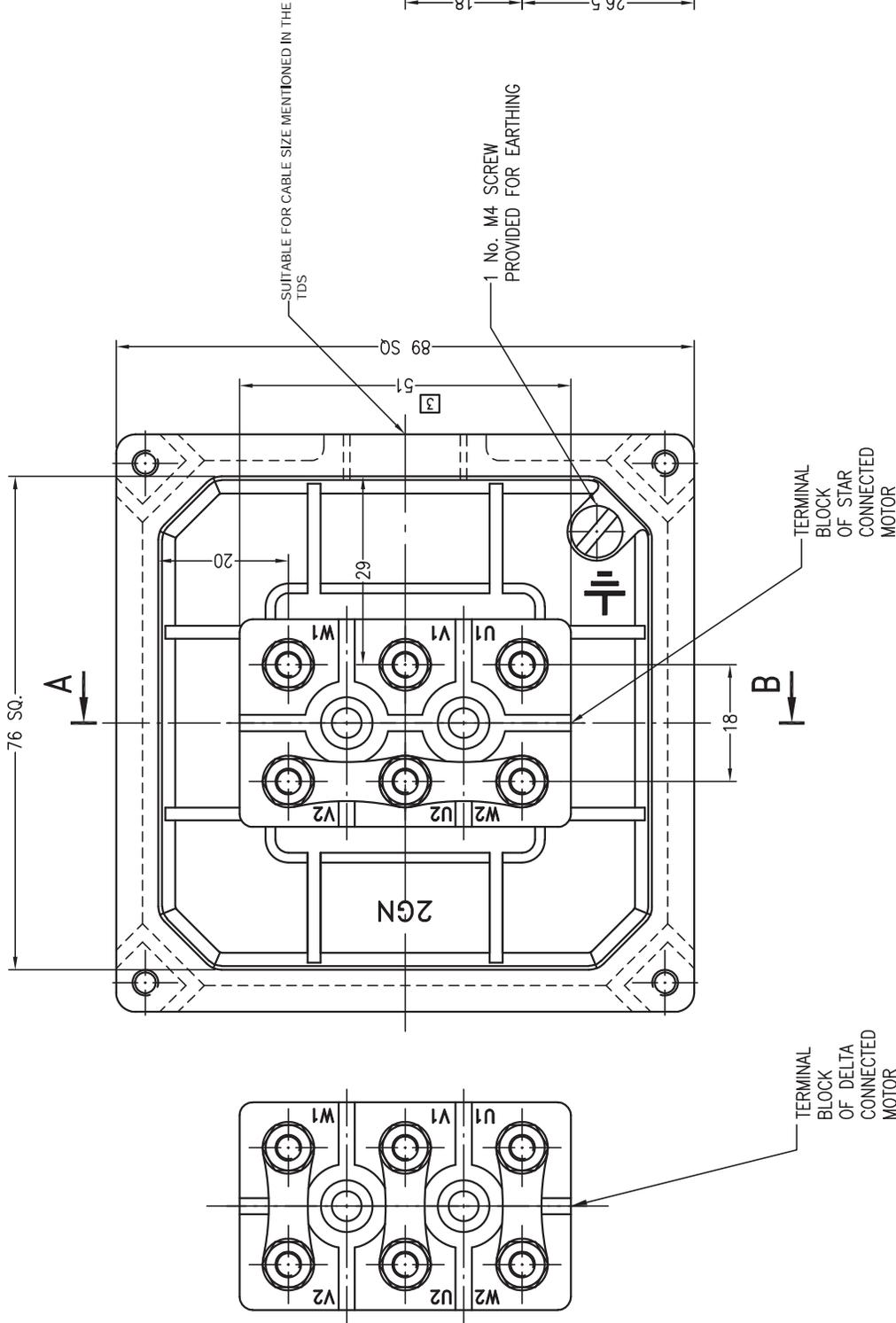
NO MACHINING	ROUGH MACHINING	SMOOTH MACHINING	FINE MACHINE/GRIND	POLES/HOLE/JAP	MACHINING SYMBOLS
~	▽	▽▽	▽▽▽	▽▽▽▽	

Dim. without tolerance as per IS:2102, very coarse

All dimensions in mm unless otherwise specified.

TITLE		PROJECTION		NAME	DATE	SCALE	NTS
OVERALL DIMENSION DRAWING		1ST ANGLE		P.V.SHINDE	19/04/05	SHT	1/1
STD./TEFC/B3 MOUNTED MOTOR		1ST ANGLE		CHD.	19/04/05	FRAME SIZE	80
		1ST ANGLE		APPD.	19/04/05	REV.	6
		1ST ANGLE		DRG. NO.:		A1-80-49(GN)	
		1ST ANGLE		REF.:		A1-80-OADIMNS-B3	

Section AB



REV. STATUS	3	TERMINAL BLOCK DIMN. 51 WAS 68 LG. [TERMINAL BLOCK AS PER DRG. No. A4-56/100-17(3C) WAS	NIMKAR/01/10/16
	2	TERMINAL BLOCK DRG. No. A4-56/090-17] DIMN. 29 REMOVED & DIMN. 6 WAS 6.5	NIMKAR/11/11/14
		DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.	
TITLE		STD. TERMINAL BOX ASSEMBLY	SCALE NTS
NAME		GANESH	SHT 1/1
DATE		16-07-11	FRAME SIZE
DRN.			63-90
CHD.			(GN)
APPD.			REF: TB-ASLY-63-90
PROJECTION			REV. 3
DRG. NO.:		A4-80/90-33(GN)	

Dim. without tolerance as per IS:2102 very coarse	
All dimensions in mm unless otherwise specified.	
NO MACHINING	~
ROUGH MACHINING	∇
SMOOTH MACHINING	∇∇
FINE MACHINING/GRIND	∇∇∇
POLISH/HONE/LAP	∇∇∇∇
MACHINING SYMBOLS	





DATA SHEET:
INDUCTION MOTOR

Motor Type
2HE3 080-04

No. of Phases		3	Reference Standard		IS:12615	
Frame Designation		80	Protection IS:4691		IP 55	
Rated Output	kW	0.55	Vibration Standard		IS:12075	
	HP	0.75	Noise Standard		IS:12065	
No. of Poles		4	Duty		S1	
Rated Voltage		V	415	Insulation Class		F
Rated Frequency		Hz	50	Cooling IS:6362		IC411
Rated Current		A	1.3	Terminal Box Details	Type	HM2GN
Rated Speed		rpm	1430		Terminal Size	M4
Rated Torque		kgm	0.37		No. of Terminal	6
					Max. cable size (Cu) mm ²	1x3Cx2.5
Efficiency	Full load	%	80.8	Bearing Data	DE	6204ZZ
	3/4 load	%	80.8		NDE	6204ZZ
	1/2 load	%	74.0		Lubrication	Prelubricated
Power factor	Full load		0.73		Life L10 (Direct Coupled) hrs.	50,000
	3/4 load		0.66		Regreasing Time hrs.	-
	1/2 load		0.53			
Max. Temp. Rise (Res.)		°C	70	Lifting Eyebolt		-
Acceleration Time		sec.	-	Motor Weight (approx) kg		15.0
Stator Connection			Y	Rotor GD ² kgm ²		0.0049
Tropicalised? (Yes / No)			Yes	Ambient Temp. °C		50
I_{st} / I_r			6.0	Overall Dimensions of Packed motor (LxBxH) (mm)		
T_{st} / T_r			2.2			
T_{po} / T_r			2.6	Voltage Variation ± %		10
Locked rotor withstand time	Hot	sec.	6	Frequency Variation ± %		5
	Cold	sec.	14	Combiend Variation ± %		10

Remarks: (1) Efficiency Class : IE3
(2) Motor Construction : TEFC
(3) Suitable Cable Gland & Lugs By AVPL
(4) Minimum Starting Voltage : 80%
(5) Permissible Fault Level : 50KA for 0.25 sec
(6) No. of Hot/Cold Starts: 3/3

Data subject to tolerance as per IEC 60034-1

Prep.: Engg

Chkd.:

Date:

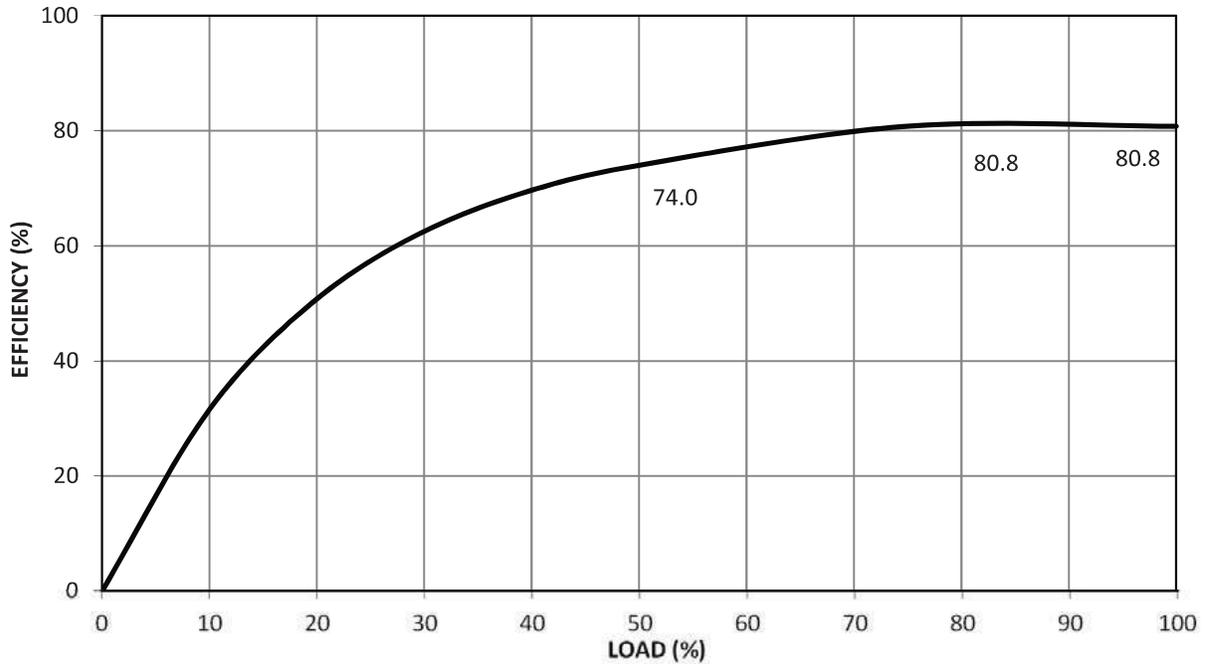
Date:

Rated Output (kW/HP) : 0.55/0.75

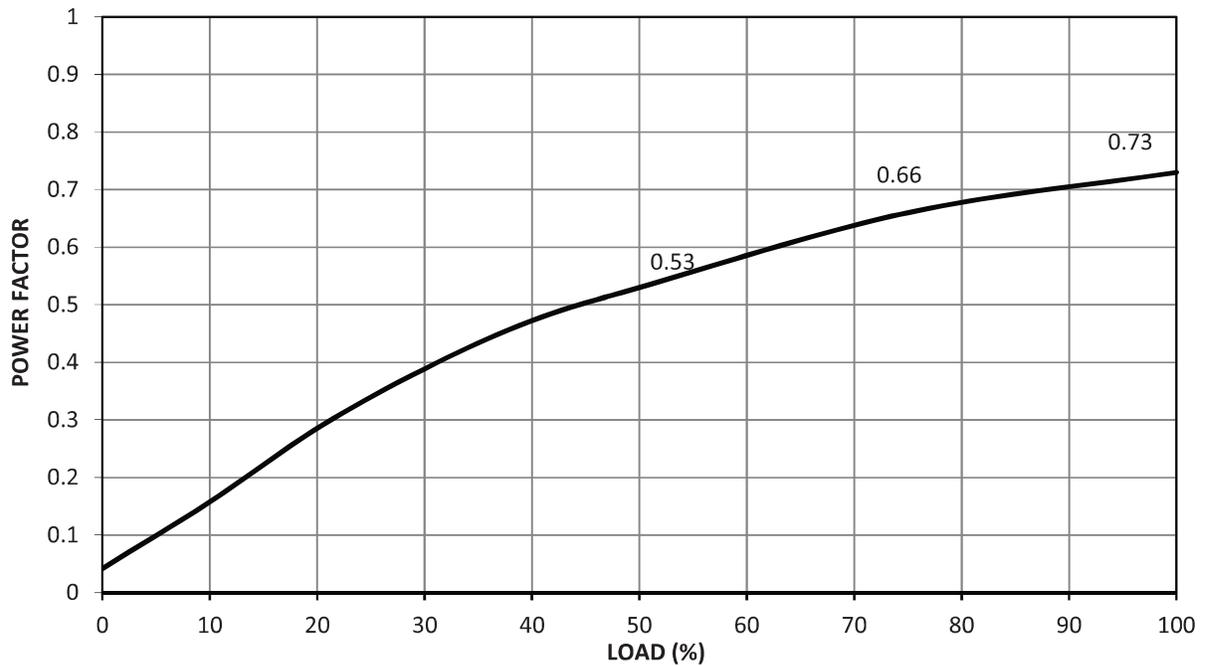
Poles : 4

Efficiency Class : IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

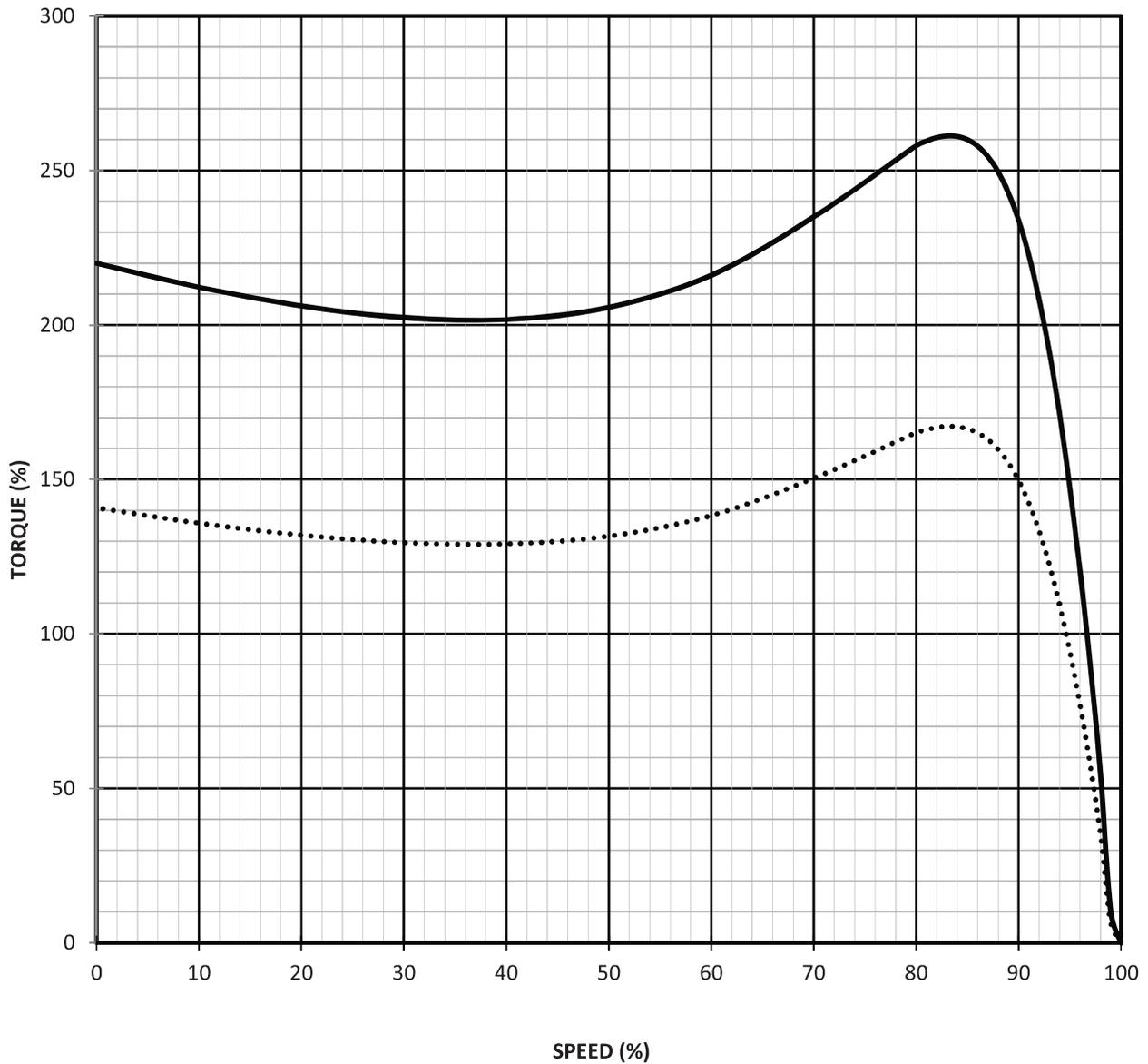


Rated Output (kW/HP) : 0.55/0.75

Poles : 4

Efficiency Class : IE3

TORQUE SPEED CURVE

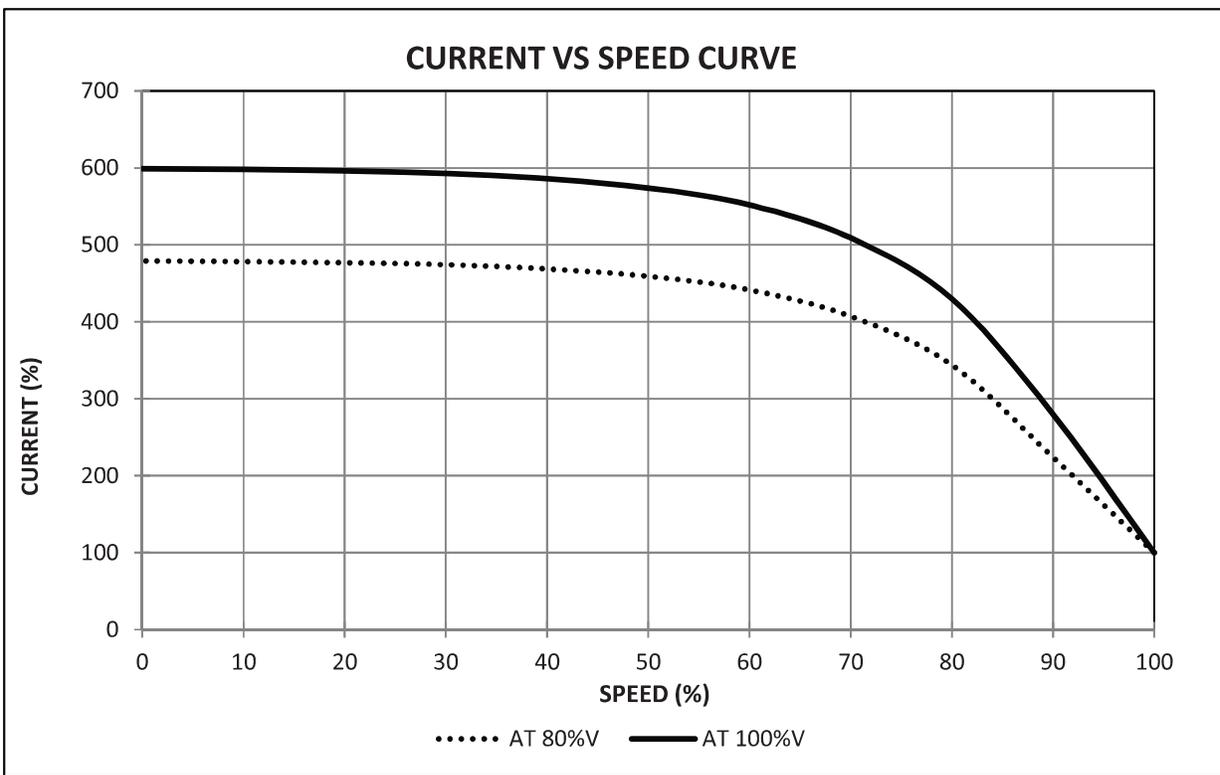
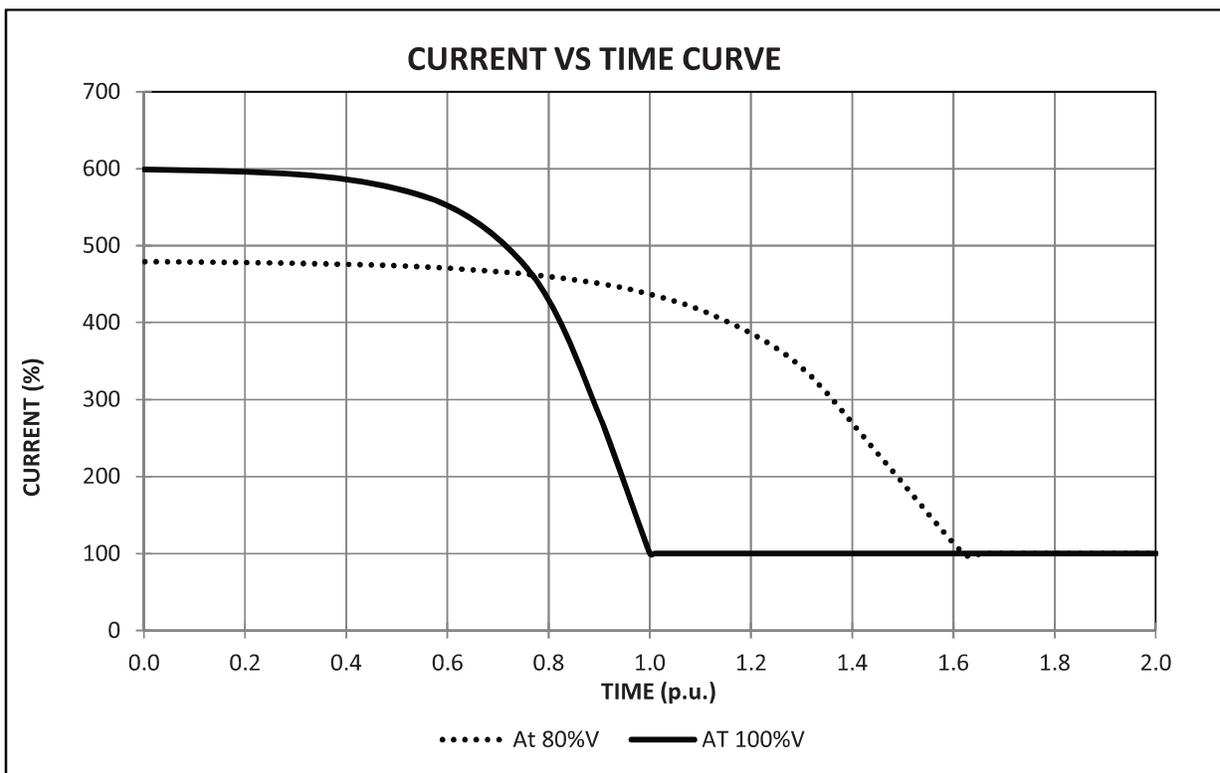


..... At 80%V ——— At 100%V

Rated Output (kW/HP) : 0.55/0.75

Poles : 4

Efficiency Class : IE3

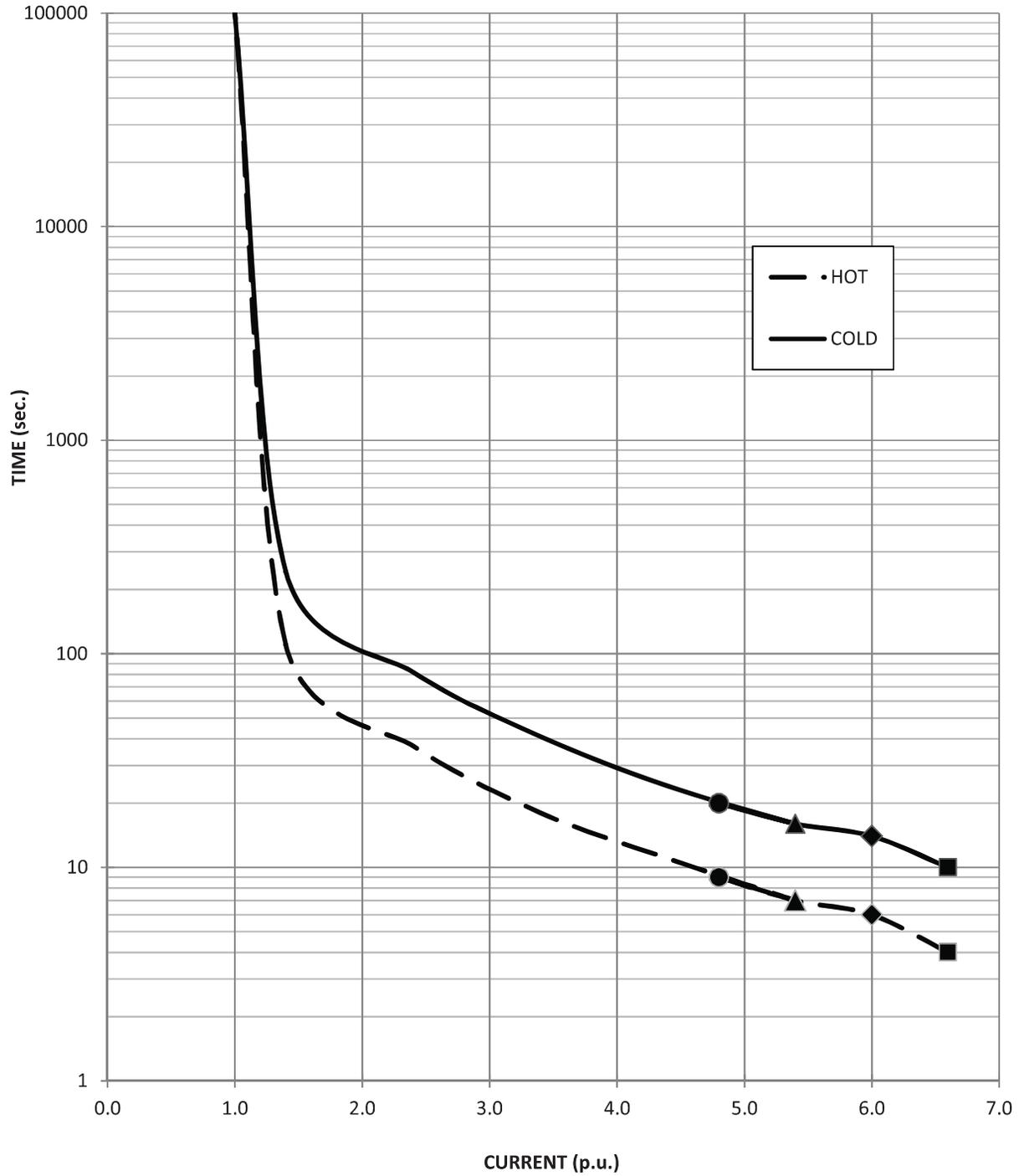


Rated Output (kW/HP) : 0.55/0.75

Poles : 4

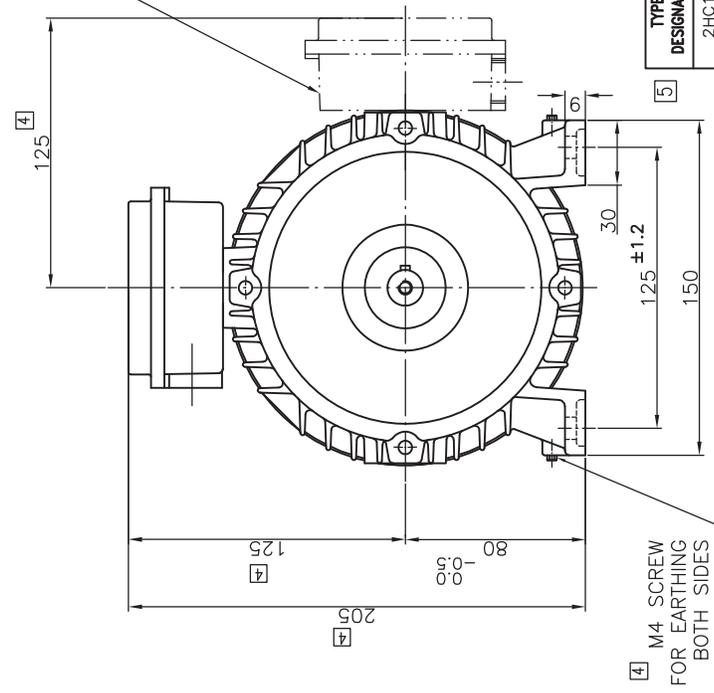
Efficiency Class : IE3

THERMAL WITHSTAND CURVE



■ At 110%V ◆ At 100%V ▲ At 90%V ● At 80%V

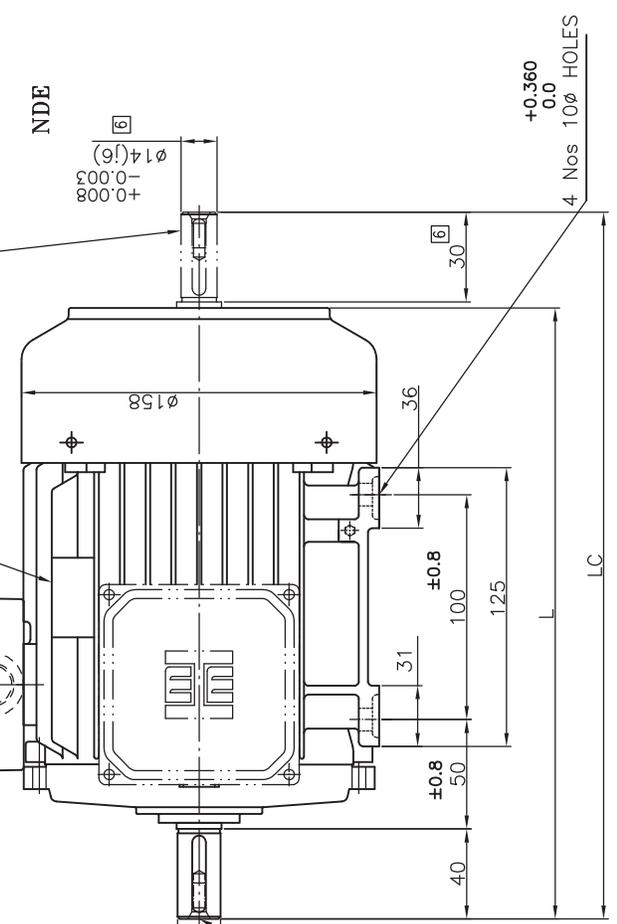
OPTIONAL LOCATION OF TERMINAL BOX ON RHS OR LHS WHEN VIEWING FROM DE (AS PER CUSTOMER REQUEST ONLY)



SUITABLE FOR CABLE SIZE MENTIONED IN THE TDS

RATING PLATE

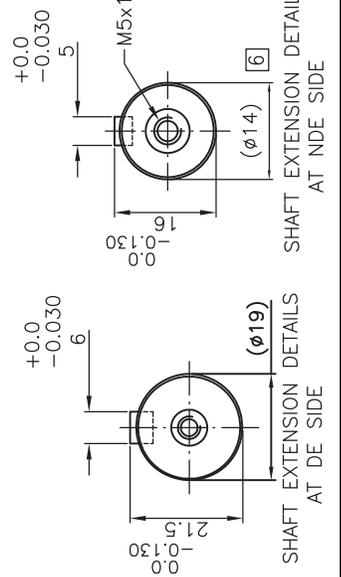
OPTIONAL SHAFT EXTENSION AT NDE (WILL BE PROVIDED ON CUSTOMER REQUEST ONLY)



DE

M6X16 DEEP

TYPE DESIGNATION	POLE	HP	L	LC
2HC1	4,6,8	-	285	319
2HE2	2,4,6	-	285	319
	4	1	325	359
2HE3	2	1		
	4	0.75	285	329
	6	0.50		
2HS1	2	1.5	325	359
	4	1		
2HS5	4/2	-	285	319
	8/4	-		
	6/4	-		
2HT1	4,8	-		



SYM	REVISIONS	BY	DATE
6		ARUN	16-09-19
5		ARUN	23-11-18
4		ARUN	12-12-16

SCALE	NTS
SHT	1/1

REV.	REV. NO.	FRAME SIZE
6	A1-80-49(GN)	80 (GN)

TITLE	PROJECTION	DRG. NO.:
OVERALL DIMENSION DRAWING STD./TEFC/B3 MOUNTED MOTOR	1st Angle	A1-80-49(GN)

NAME	DATE
P.V.SHINDE	19/04/05
S.P.JADIA	19/04/05
S.P.JADIA	19/04/05

DRN.	CHD.	APPD.
P.V.SHINDE	S.P.JADIA	S.P.JADIA

Dim. without tolerance as per IS:2102, very coarse

All dimensions in mm unless otherwise specified.

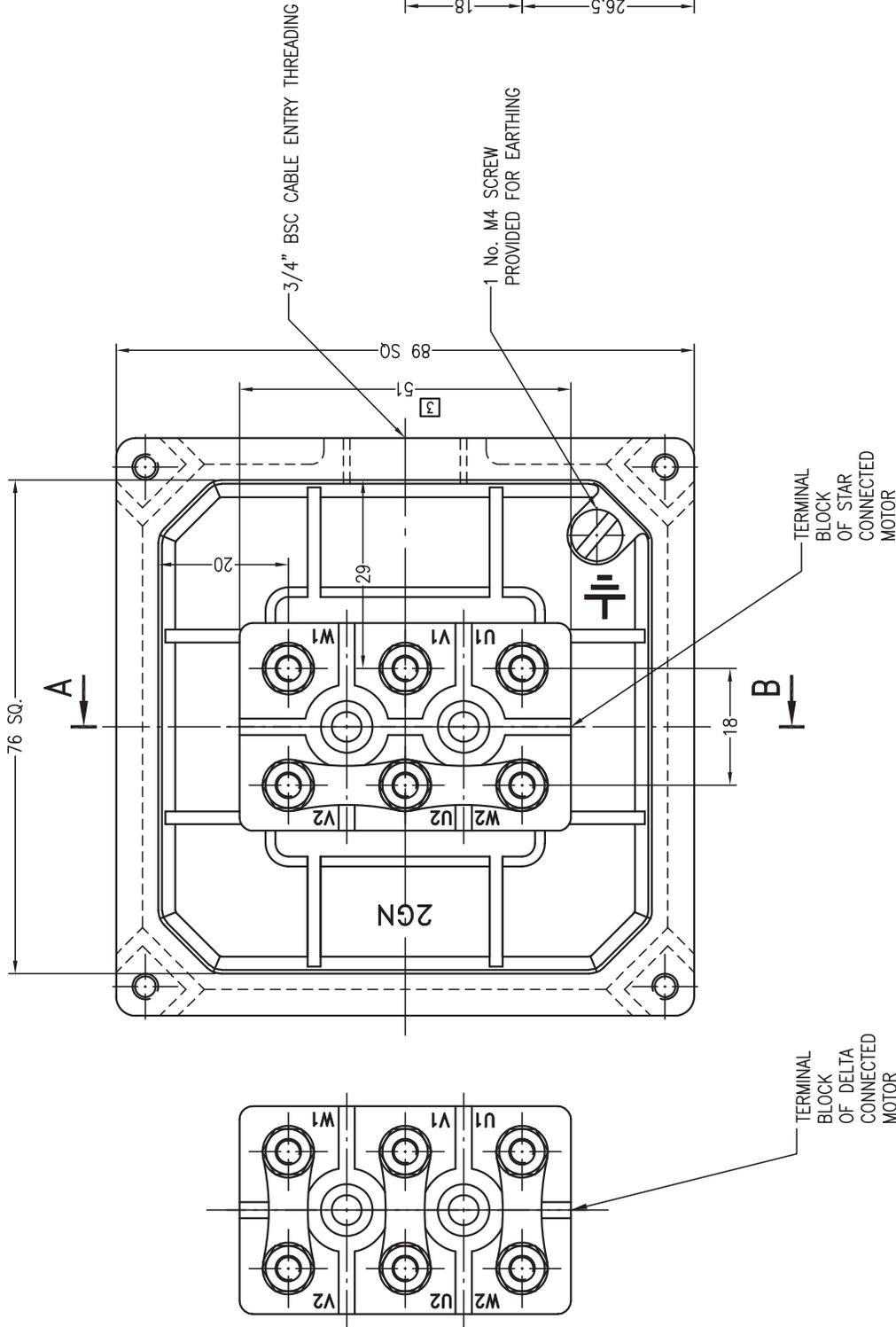
NO MACHINING	ROUGH MACHINING	SMOOTH MACHINING	FINE MACHINE/GRIND	POLES/ROSE/JAP	MACHINING SYMBOLS
~	▽	▽▽	▽▽▽	▽▽▽▽	

NDE SIDE SHAFT EXTN. DIA.14x30LG. WAS DIA.19x40LG. & DIMS 319, 359 WAS 329, 369 AS PER VERBAL INSTRUCTIONS RECD. FROM MR. SANJAY JADIA CONSIDERING TO PROPOSED MECHANICAL DIMS. CHART - IE2 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE

TABLE UPDATED, TYPE DESIGNATION WAS P.No & 2HC1, 2HE2, 2HE3, 2HS5, 2HT1 WAS P.No 2 & DIMS 302, 346 REMOVED FROM TABLE & ADDED. 325, 369 DIMS IN TABLE & DIMS 285, 329 WAS 282, 326, TO UPLOAD THIS DRG. ON PORTAL

DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES & DIMS.302,282,125,205,WAS 301,281,122 ,202 & EARTHING SCREW SIZE M4 WAS M5, P.No.1.2 WAS EFFICIENCY EFF1, EFF2 & RATING PLATE ADDED

Section AB



REV. STATUS	3	TERMINAL BLOCK DIMN. 51 WAS 68 LG. [TERMINAL BLOCK AS PER DRG. No. A4-56/100-17(3C) WAS	NIMKAR/01/10/16
	2	TERMINAL BLOCK DRG. No. A4-56/090-17] DIMN. 29 REMOVED & DIMN. 6 WAS 6.5	NIMKAR/11/11/14
		DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.	
TITLE		STD. TERMINAL BOX ASSEMBLY	SCALE NTS
PROJECTION		DRG. NO.:	SHT 1/1
NAME		DRG. NO.:	FRAME SIZE
DATE		A4-80/90-33(GN)	63-90
DRN.		REF: TB-ASLY-63-90	(GN)
CHD.			
APPD.			

Dim. without tolerance as per IS:2102 very coarse	
All dimensions in mm unless otherwise specified.	
NO MACHINING	~
ROUGH MACHINING	∇
SMOOTH MACHINING	∇∇
FINE MACHINE/GRIND	∇∇∇
POLISH/HONE/LAP	∇∇∇∇
MACHINING SYMBOLS	

**BIDDER SHALL
COMPLY MOTOR
RATING FOR AHU
AS SPECIFIED**

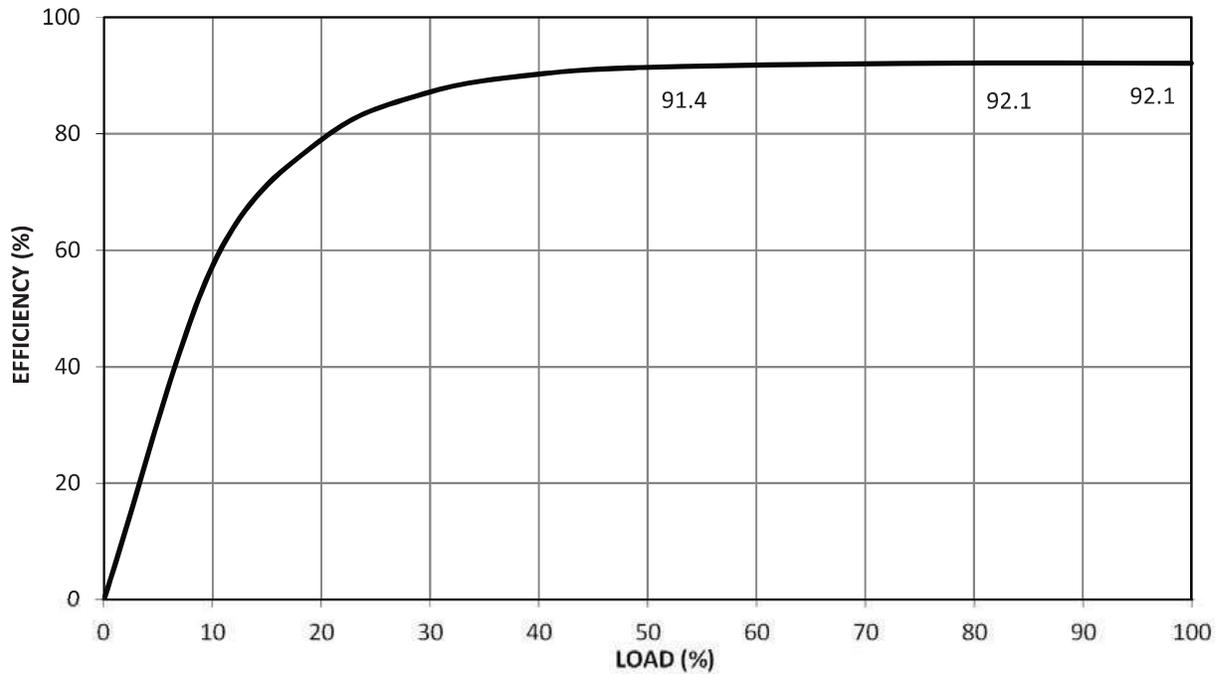
		DATA SHEET: INDUCTION MOTOR		Motor Type 2HE3 166-04		
No. of Phases		3	Reference Standard		IS:12615	
Frame Designation		160L	Protection IS:4691		IP 55	
Rated Output	kW	15.0	Vibration Standard		IS:12075	
	HP	20.0	Noise Standard		IS:12065	
No. of Poles		4	Duty		S1	
Rated Voltage		V	415	Insulation Class		F
Rated Frequency		Hz	50	Cooling IS:6362		IC411
Rated Current		A	26.2	Terminal Box Details	Type	HM4GN
Rated Speed		rpm	1470		Terminal Size	M6
Rated Torque		kgm	9.94		No. of Terminal	6
Efficiency	Full load	%	92.1	Bearing Data	Max. cable size (AL)	mm ² 1x3Cx25.0
	3/4 load	%	92.1		DE	6309ZZ
	1/2 load	%	91.4		NDE	6209ZZ
Power factor	Full load		0.86	Lubrication	Prelubricated	
	3/4 load		0.83	Life L10 (Direct Coupled)	hrs.	50,000
	1/2 load		0.74	Regreasing Time	hrs.	-
Max. Temp. Rise (Res.)		°C	70	Lifting Eyebolt		M12
Acceleration Time		sec.	-	Motor Weight (approx)		kg 132.0
Stator Connection			D	Rotor GD ²		kgm ² 0.3032
Tropicalised? (Yes / No)			Yes	Ambient Temp.		°C 50
I _{st} / I _r			7.0	Overall Dimensions of Packed motor (LxBxH) (mm)		
T _{st} / T _r			2.4			
T _{po} / T _r			2.7	Voltage Variation ±		% 10
Locked rotor withstand time	Hot	sec.	9	Frequency Variation ±		% 5
	Cold	sec.	20	Combiend Variation ±		% 10
Remarks: (1) Efficiency Class : IE3 (2) Motor Construction : TEFC (3) Suitable Cable Gland & Lugs BY AVPL (4) Minimum Starting Voltage : 80% (5) Permissible Fault Level: 50KA for 0.25 sec (6) No. of Hot/Cold Starts: 3/3						
Data subject to tolerance as per IEC 60034-1						
Prep.: Engg		Chkd.:				
Date:		Date:				

Rated Output (kW/HP) : 15.0/20.0

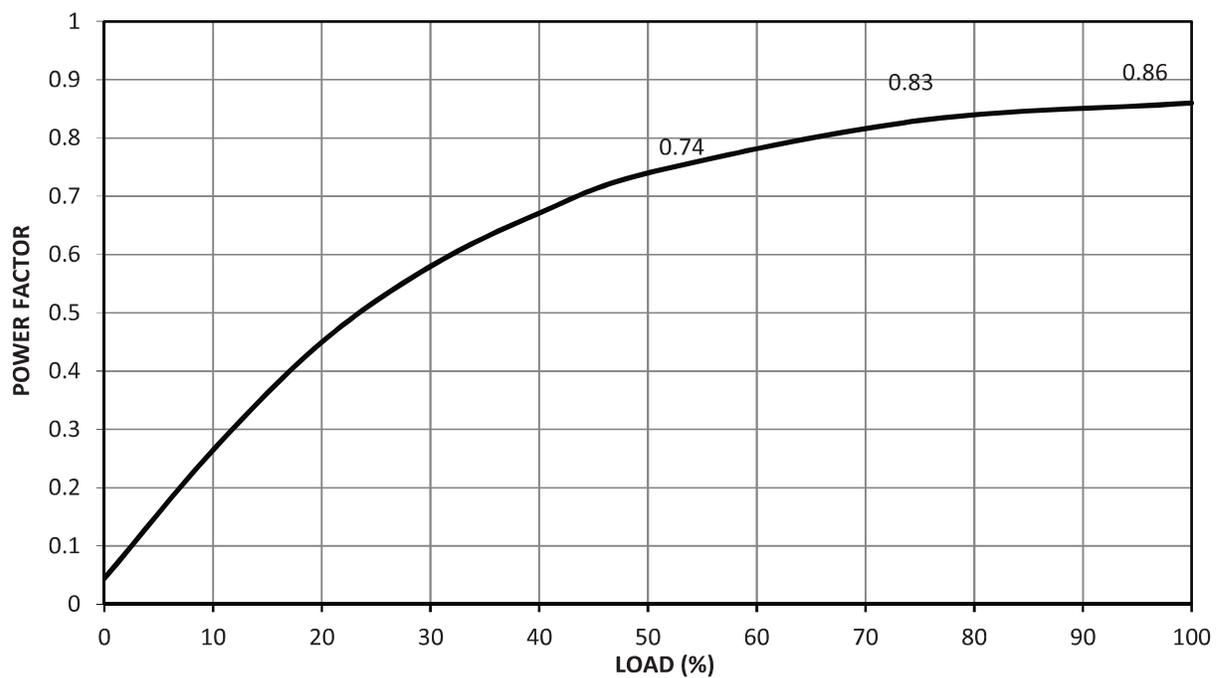
Poles : 4

Efficiency Class : IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

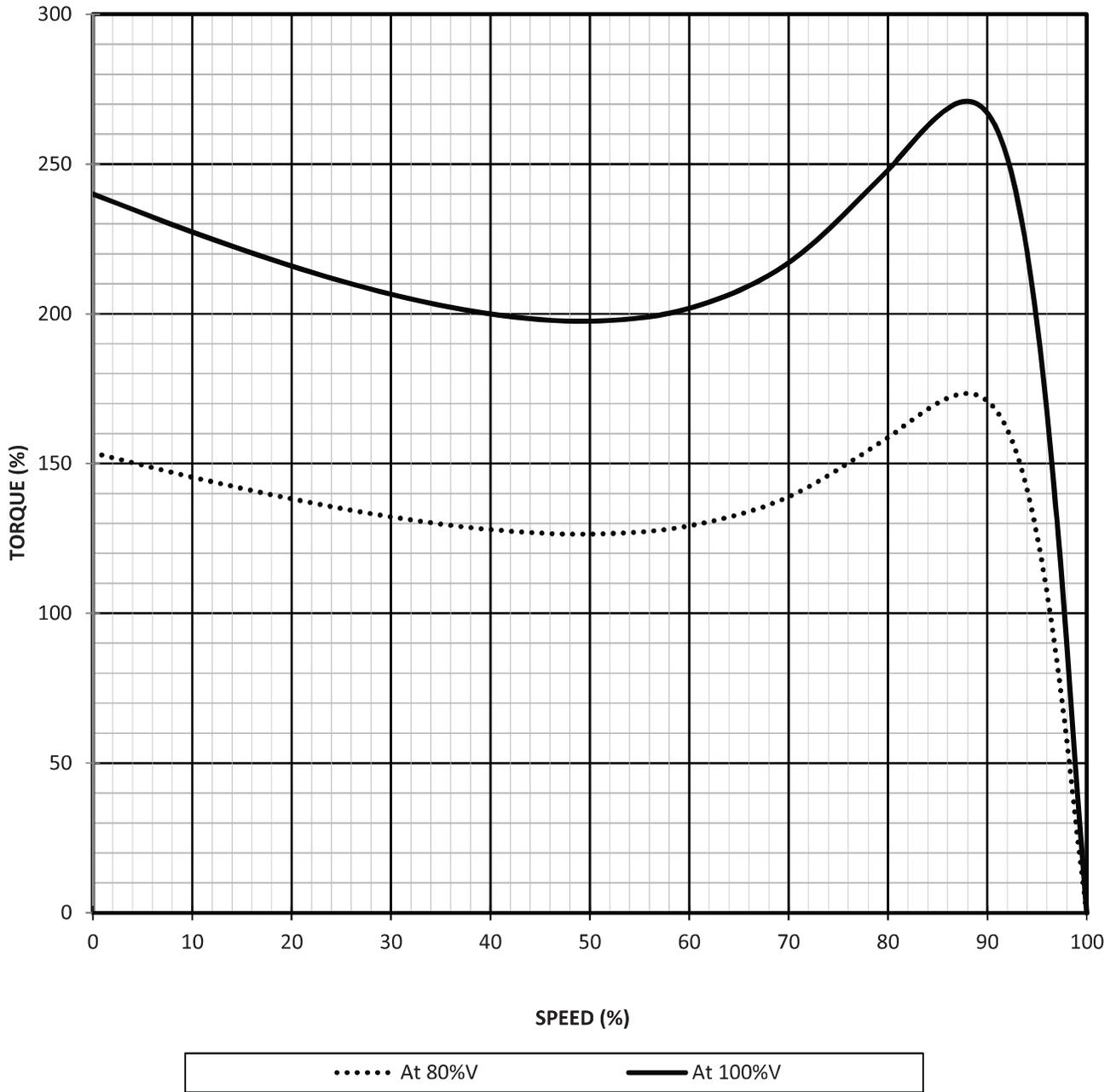


Rated Output (kW/HP) : 15.0/20.0

Poles : 4

Efficiency Class : IE3

TORQUE SPEED CURVE



Prep.:

SK

Date:

25-12-2021

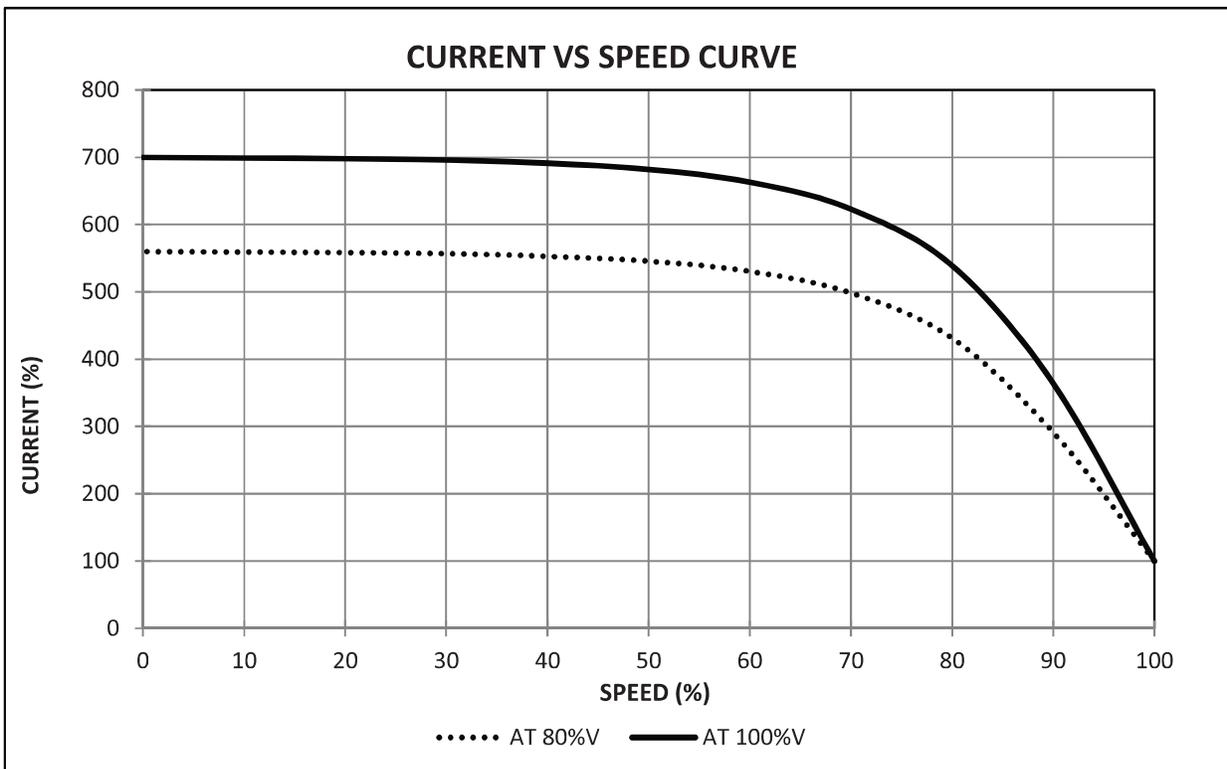
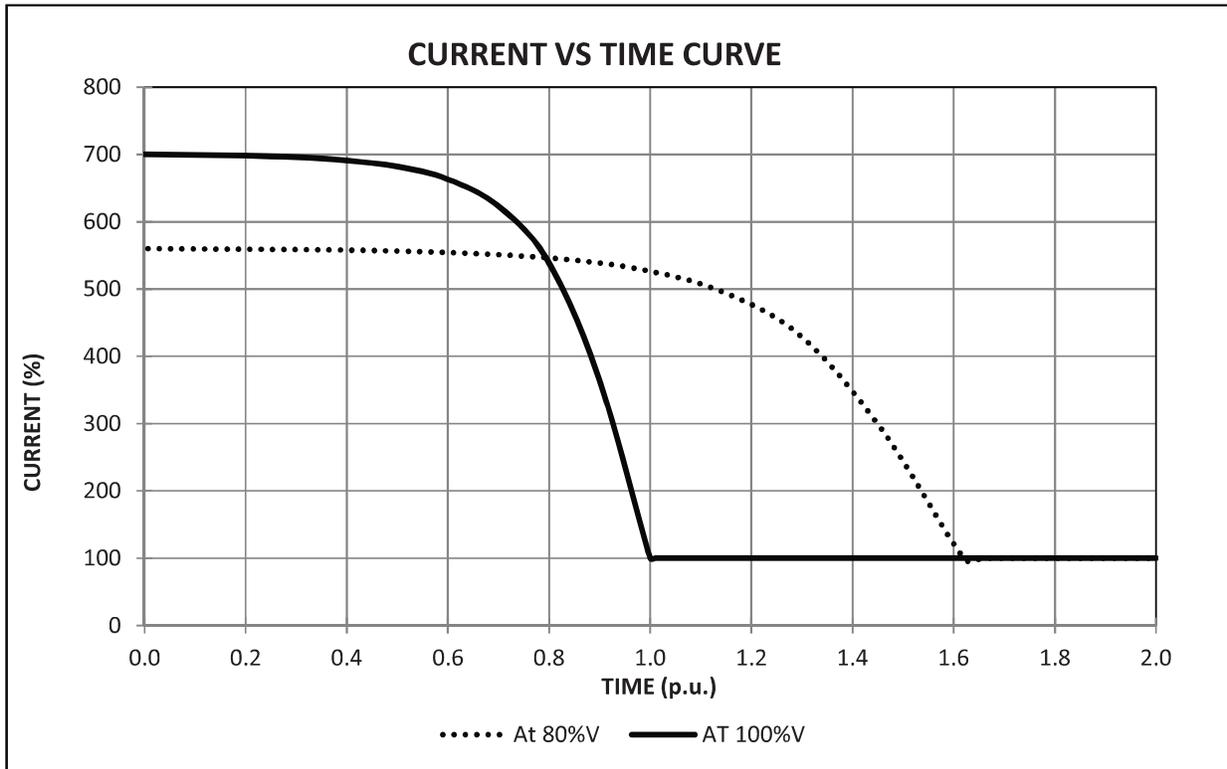
Revision:

-

Rated Output (kW/HP) : 15.0/20.0

Poles : 4

Efficiency Class : IE3

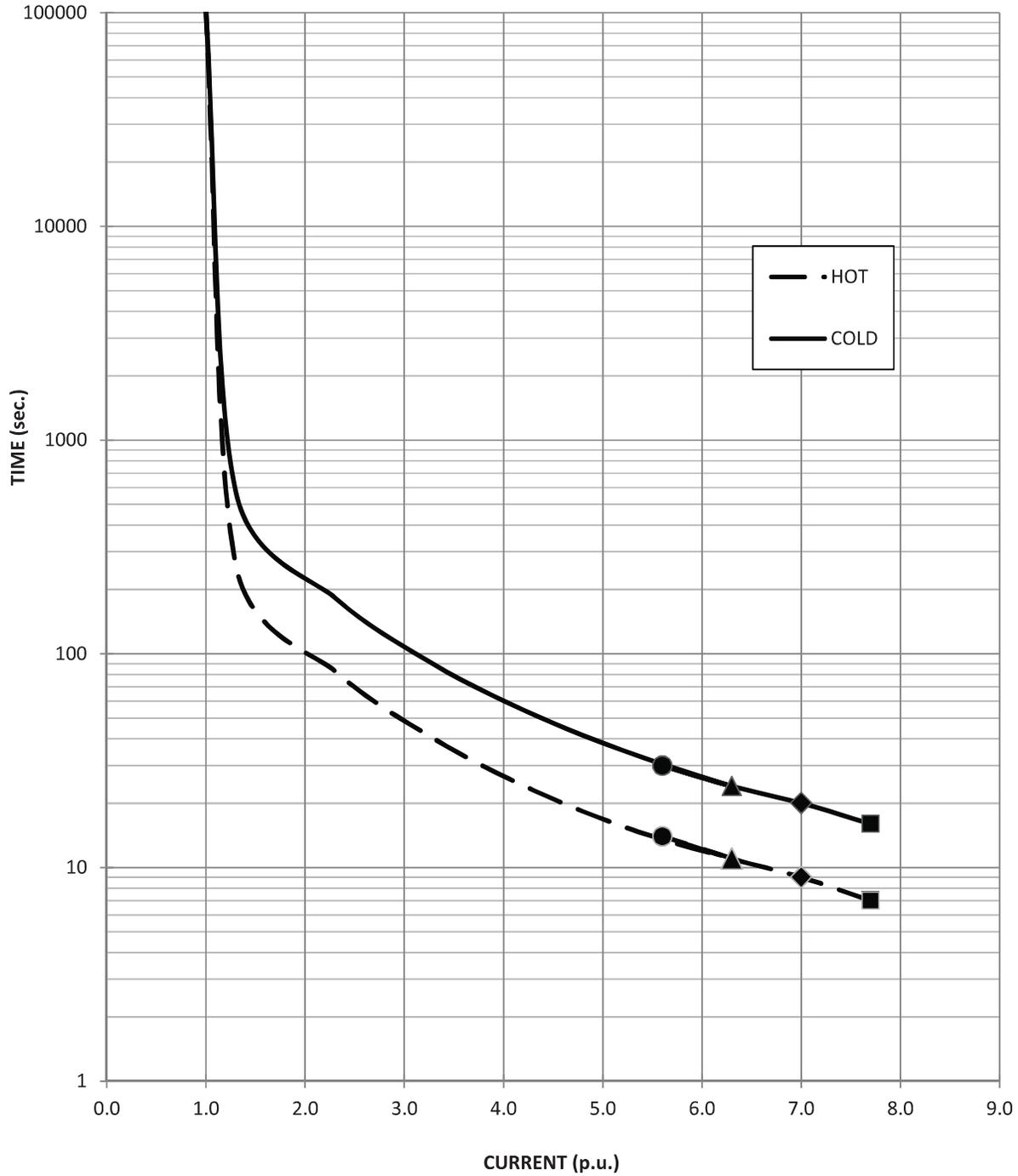


Rated Output (kW/HP): 15.0/20.0

Poles: 4

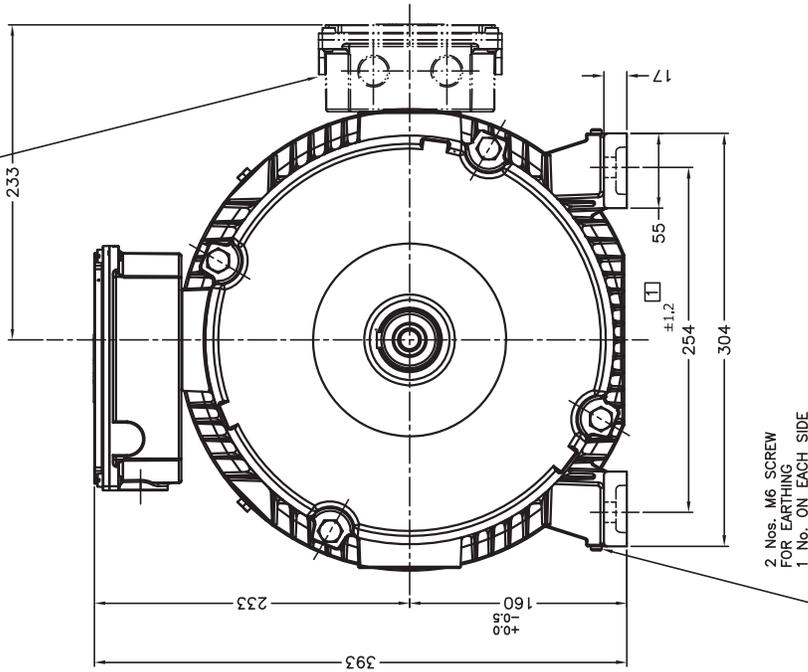
Efficiency Class: IE3

THERMAL WITHSTAND CURVE



At 110%V
 At 100%V
 At 90%V
 At 80%V

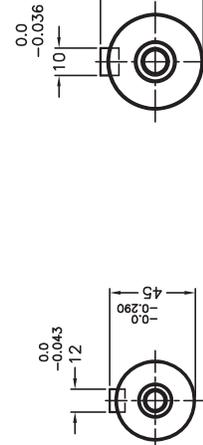
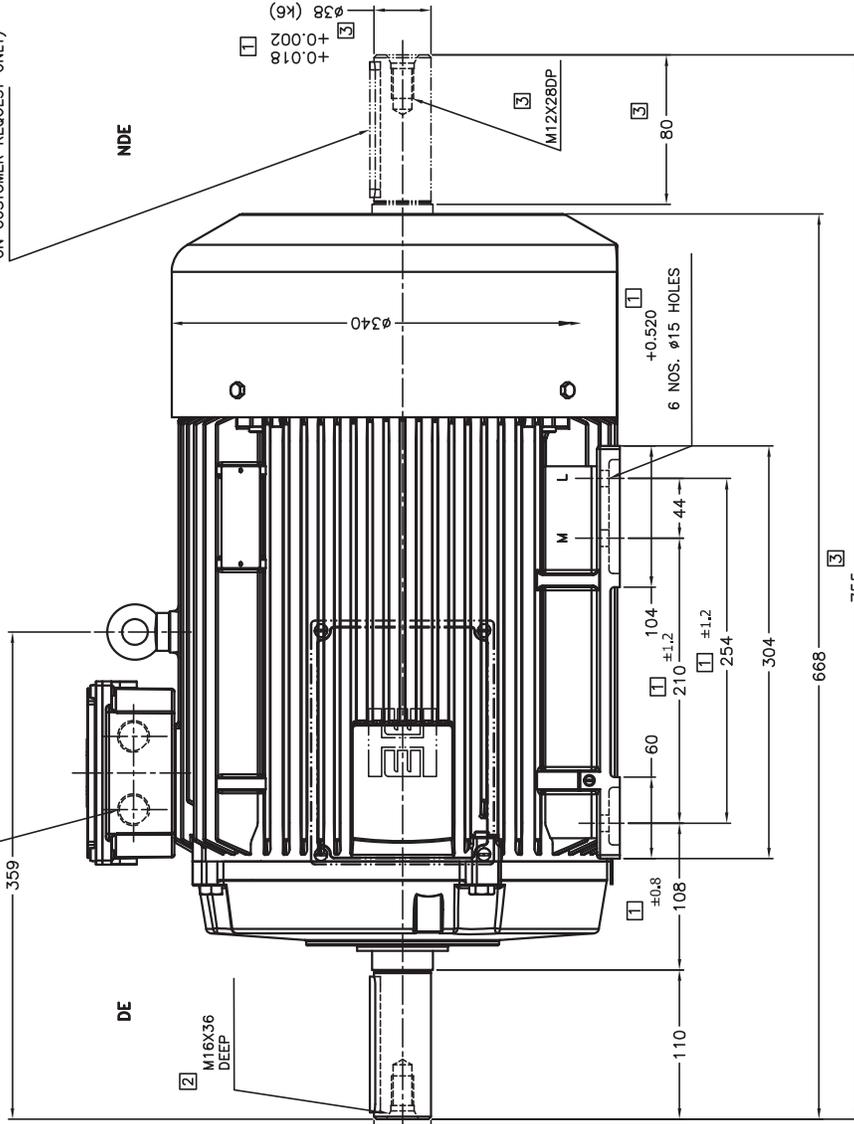
OPTIONAL LOCATION OF
TERMINAL BOX RHS OR LHS
WHEN VIEWING FROM DE
(AS PER CUSTOMER REQUEST ONLY)



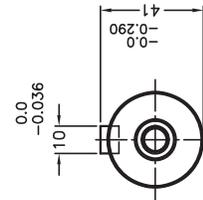
2 Nos. M6 SCREW
FOR EARTHING
1 No. ON EACH SIDE

2 NOS. SUITABLE FOR CABLE SIZE MENTIONED IN THE
TDS

OPTIONAL SHAFT EXTENSION
AT NDE (WILL BE PROVIDED
ON CUSTOMER REQUEST ONLY)



SHAFT EXTENSION
DETAILS AT DE



SHAFT EXTENSION
DETAILS AT NDE

REV. STATUS	SYM	REVISIONS	BY	DATE
1		TOLERANCE +0.002 WAS - 0.002, TOLERANCE ADDED ON DIMN. 210, 254, 108, & Ø15 . STD. ADDED IN TITLE.	LANKESH	11/8/18
2		M16x36 TAP DEEP WAS M16x32 AS PER PRESENT SHAFT DESIGN	ARUN	25/9/18
3		NDE SIDE SHAFT EXTN. DIA 38Ø10.G. WAS DIA 42Ø11.0.G. & DIMS 755 WAS 765 AS PER VERBAL INSTRUCTIONS RECD. FROM Mr. SANJAY JADA CONSIDERING TO PROPOSED MECHANICAL DIMNS. CHART - IE3 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE	LANKESH	10-01-20

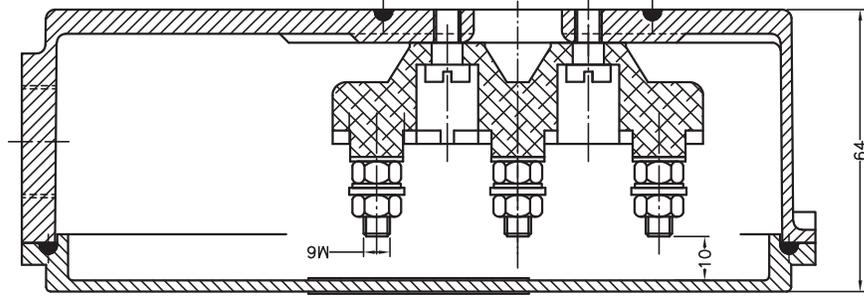
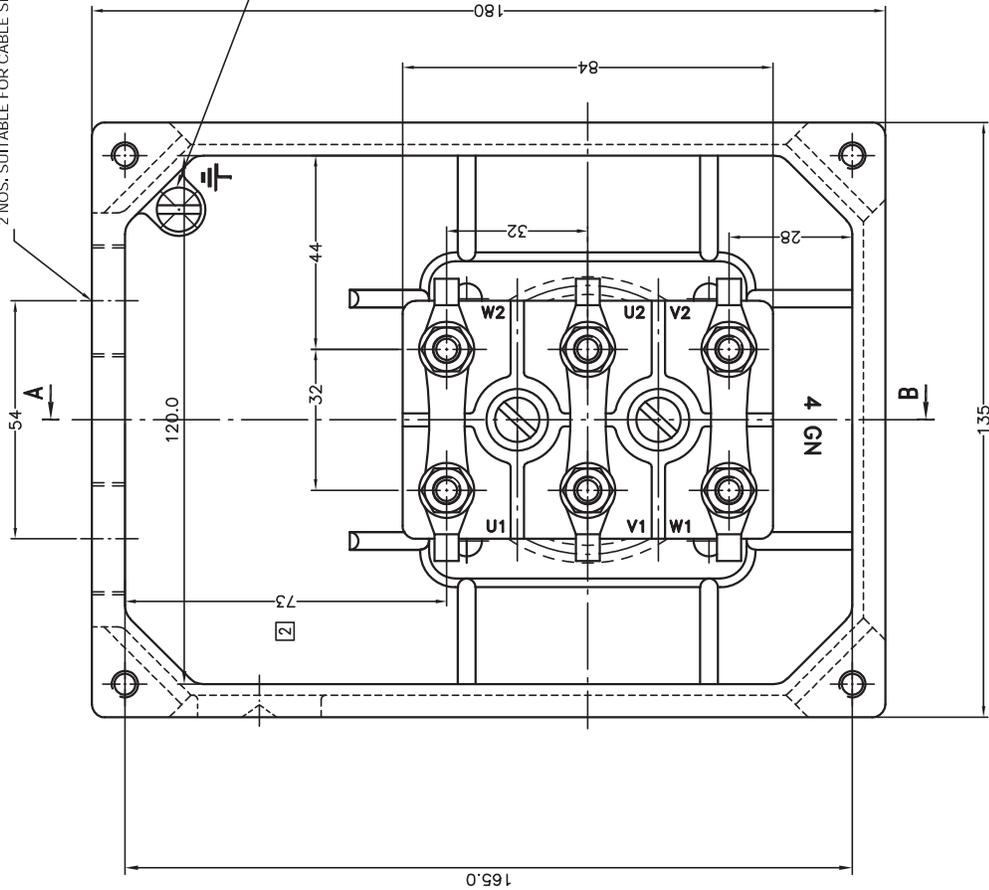
TITLE		SCALE		NTS	
OVERALL DIMENSION DRAWING TEFC/B3/ IE3 STD/FOOT MOUNTED MOTOR		1/1		1/1	
DRN. AKSHAY		APPROV. S.P.JADA		REV. 3	
CHD. S.P.JADA		APPROV. S.P.JADA		FRAME SIZE 160M/L	
APPD. S.P.JADA		APPROV. S.P.JADA		DRG. NO.: 44-16-051-0058	
MACHINING SYMBOLS		NO. MACHINING		REF : 160ML-IE3-0A01M-B3	
NO. MACHINING		ROUGH MACHINING		PROJECTION	
SMOOTH MACHINING		FINE MACHINING		1:1	
POLISH/WINE/AP		POLISH/WINE/AP		REV. 3	

Dim. without tolerance as per IS:2102, very coarse unless otherwise specified.



NAME	DATE
AKSHAY	21-12-13
S.P.JADA	21-12-13
S.P.JADA	21-12-13

2 NOS. SUITABLE FOR CABLE SIZE MENTIONED IN THE TDS



REV. STATUS

2 DIM. 73 ADDED.

1 DRAWING REDRAWN ON NEW CAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.

SAURABH 03/06/15

NIMKAR 05/07/13



TITLE

TERMINAL BOX ASSEMBLY

SCALE NTS

SHT 1/1

FRAME SIZE
160-180
(GN)

REV. 2

DRG. NO.: A3-160/180-33(GN)



PROJECTION

REF. 3-tbassy

All dimensions in mm unless otherwise specified.

NO. MACHINING	MACHINING SYMBOLS
ROUGH MACHINING	▽
SMOOTH MACHINING	▽▽
FINE MACHINE/GRIND	▽▽▽
POLISH/HONE/LAP	▽▽▽▽

APPD. S.P.JADIA 05/08/11

CHD. S.P.JADIA 05/08/11

DRN. GAMESH 05/08/11

NAME DATE

S.P.JADIA 05/08/11

No. of Phases		3	Reference Performance	IS:12615		
Frame Designation		90 FLP	Standard Enclosure	IS:60079-1		
Rated Output	kW	1.1	Protection IS:4691	IP 55		
	HP	1.5	Vibration Standard	IS:12075		
No. of Poles		6	Noise Standard	IS:12065		
Rated Voltage		V	Duty	S1		
Rated Frequency		Hz	Insulation Class	F		
Rated Current		A	Cooling IS:6362	IC411		
Rated Speed		rpm	Terminal Box Details	Terminal Size	M4	
Rated Torque		kgm		No. of Terminal	6	
Efficiency	Full load	%	81.0	Max. cable size	mm ² 2x3Cx2.5	
	3/4 load	%	81.0	DE	6205ZZ	
	1/2 load	%	76.0	NDE	6205ZZ	
Power factor	Full load		0.70	Bearing Data	Lubrication	Prelubricated
	3/4 load		0.67		Life L10 (Direct coupled)	hrs. 50,000
	1/2 load		0.60		Regreasing Time	hrs. -
Temp. Rise (Res.)		°C	70	Lifting Eyebolt IS:4190	M8	
Acceleration Time		sec.	-	Motor Weight (approx)	kg 30	
Stator Connection			Y	Rotor GD ²	kgm ² 0.019	
Tropicalised? (Yes/No)			Yes	Ambient Temp.	°C 50	
I_{st} / I_r		%	5.5	Overall Dimensions of Packed motor (LxBxH) (mm)		
T_{st} / T_r		%	2.2	-		
T_{po} / T_r		%	2.6	Voltage Variation ±	% 10	
Locked rotor withstand time	Hot	sec	12	Frequency Variation ±	% 5	
	Cold	sec	26	Combiend Variation ±	% 10	

Remarks: (1) Efficiency Class : IE3 (6) Permissible Fault Level: 50KA for 0.25 sec
 (2) Motor construction: TEFC (7) No. of Hot/Cold Starts: 3/3
 (3) Suitable Cable Gland & Lugs BY AVPL
 (3) Temp Class: T5 & Explosion Protection : Ex'd'
 (4) Motor suitable for Gas Gr. IIA / IIB, Zone I & II
 (5) Minimum Starting Voltage : 80%

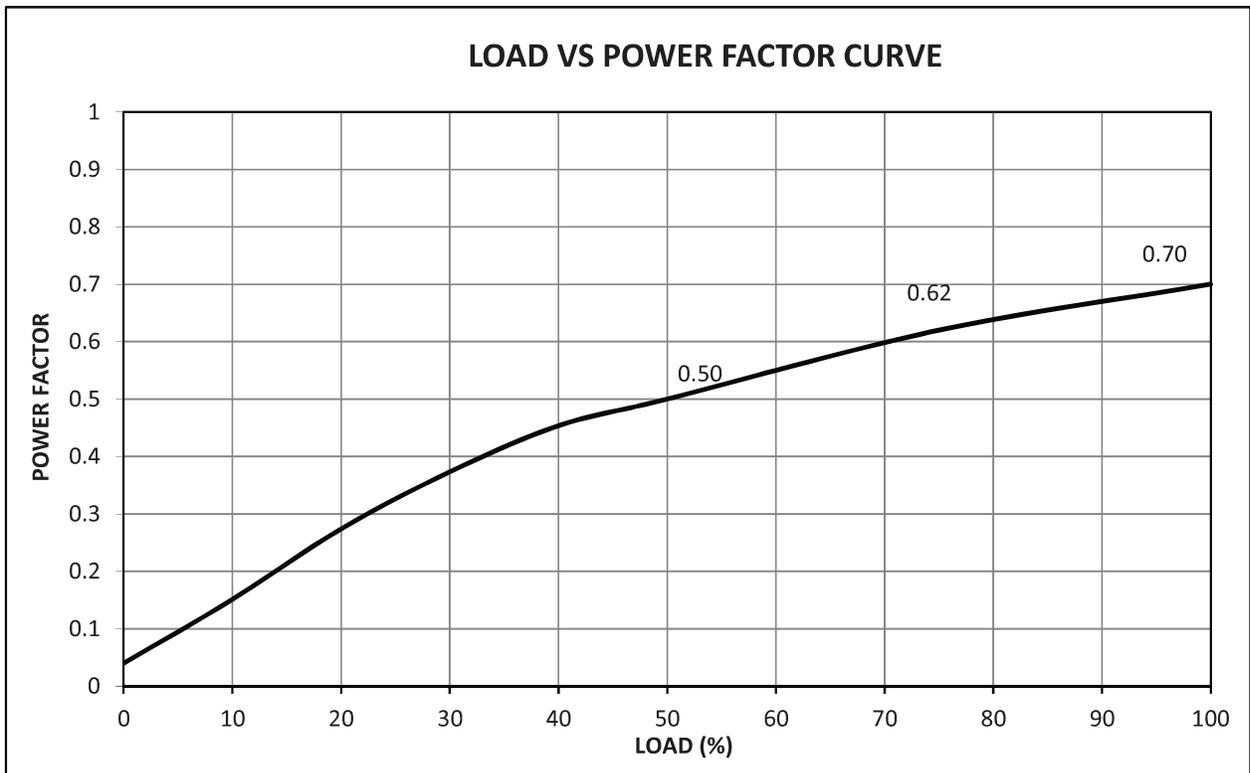
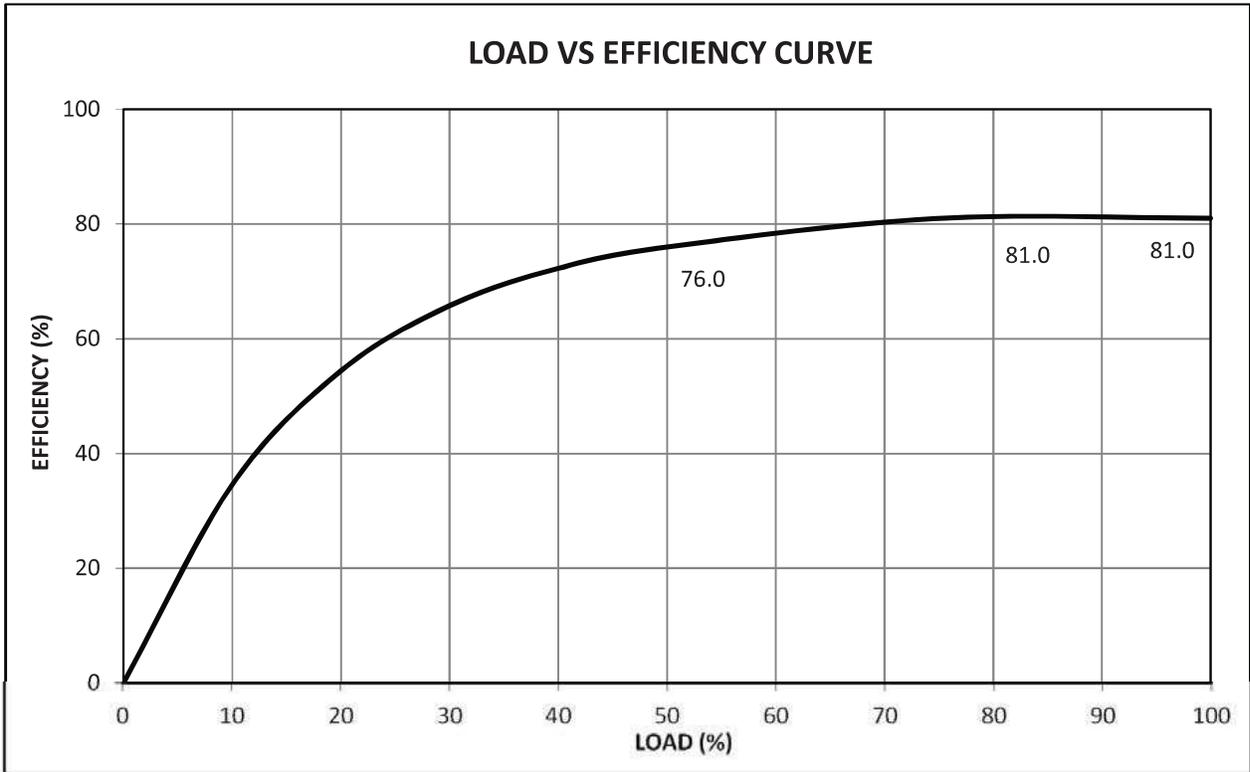
Data subject to tolerance as per IS:12615.

Prep.: Engg	Chkd.:	
Date:	Date:	

Rated Output (kW/HP) : 1.1/1.5

Poles : 6

Efficiency Class : IE3

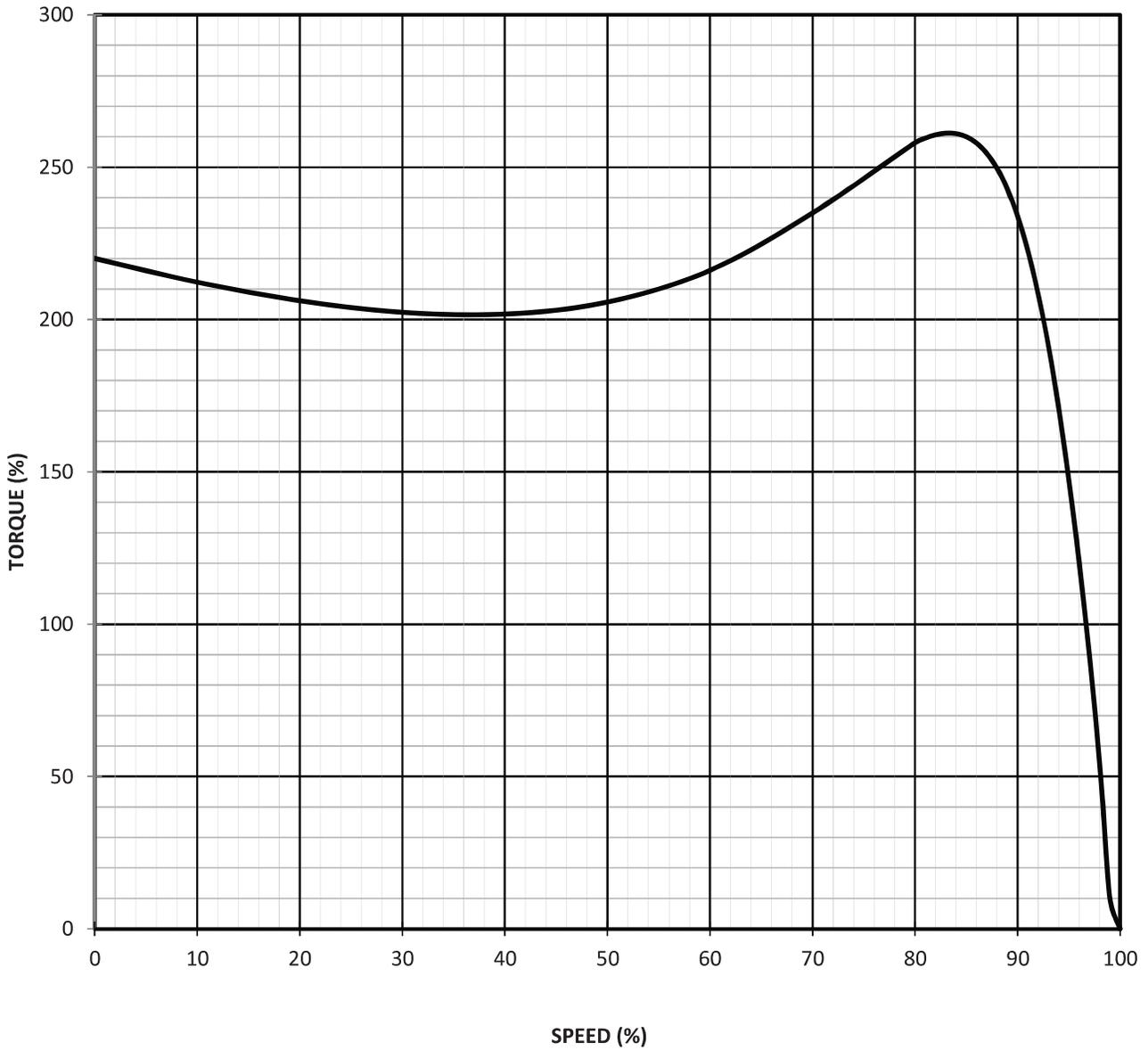


Rated Output (kW/HP): 1.1/1.5

Poles : 6

Efficiency Class : IE3

TORQUE SPEED CURVE



Prep.:

SK

Date:

□□□□□□□□

Revision:

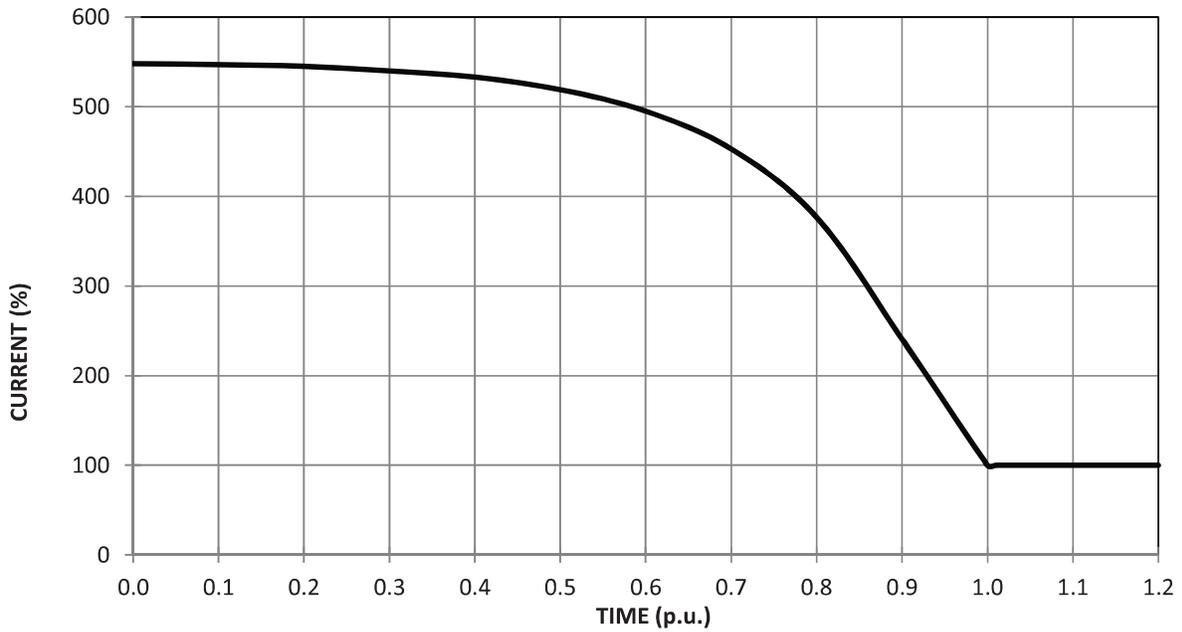
□

Rated Output (kW/HP) : 1.1/1.5

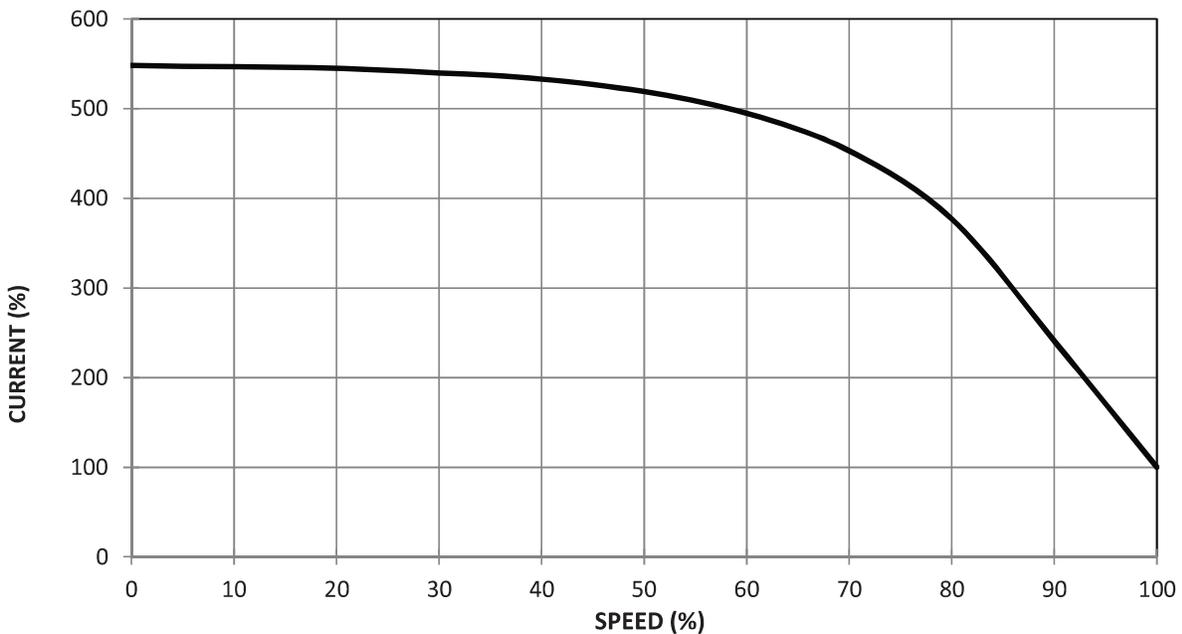
Poles : 6

Efficiency Class : IE3

CURRENT VS TIME CURVE



CURRENT VS SPEED CURVE



Prep.:

SK

Date:

□□□□□□□□

Revision:

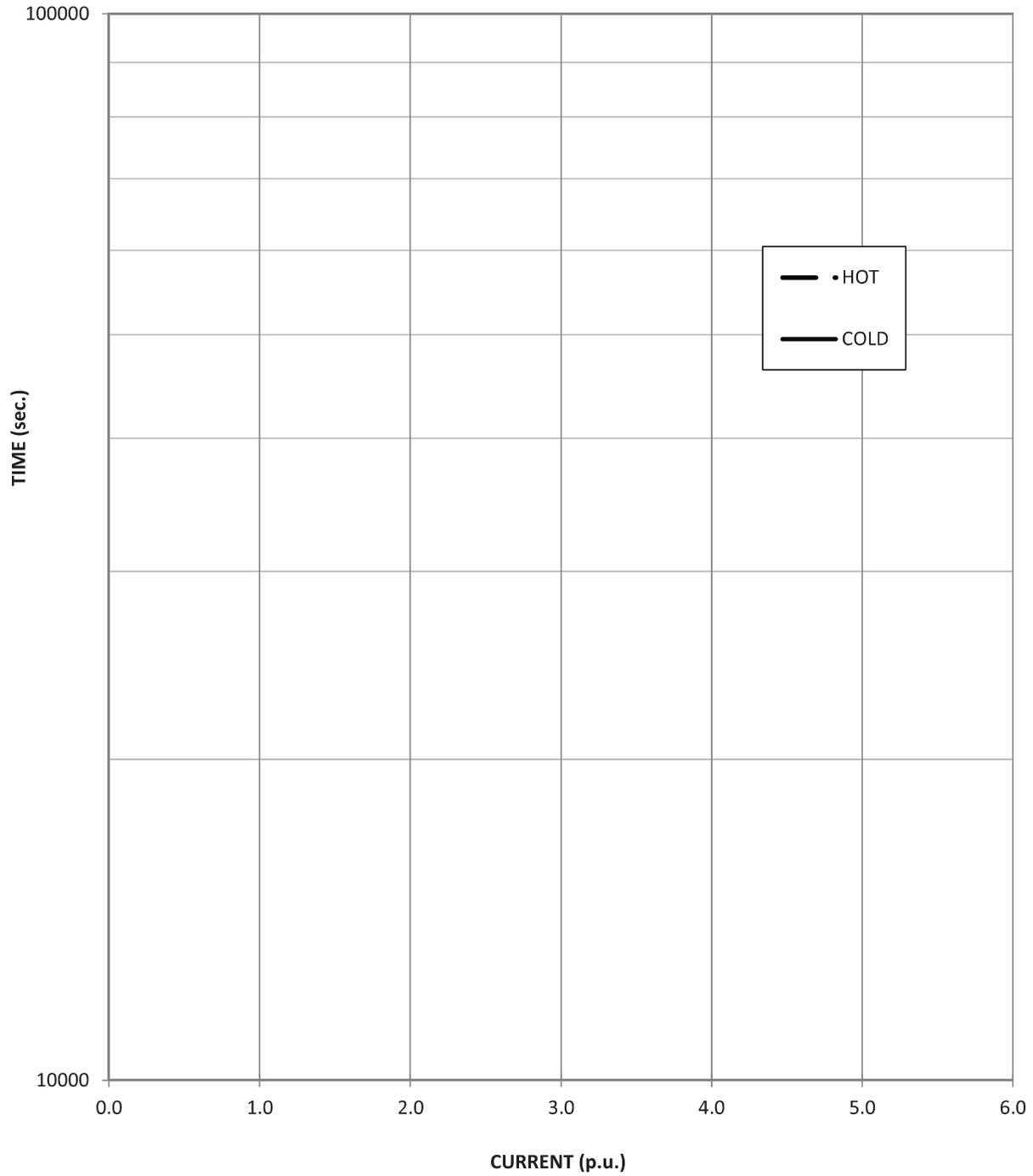
□

Rated Output (kW/HP) : 1.1/1.5

Poles : 6

Efficiency Class : IE3

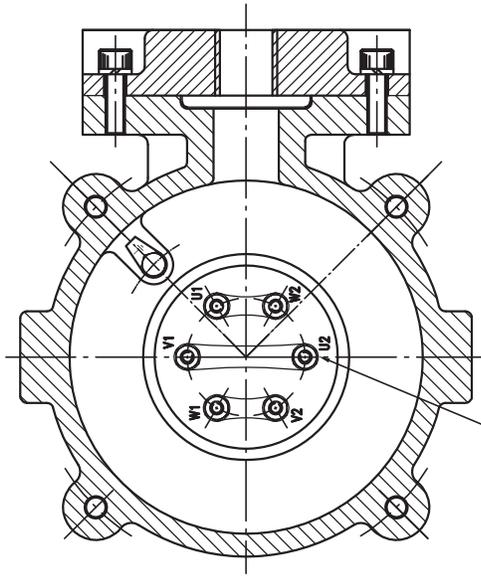
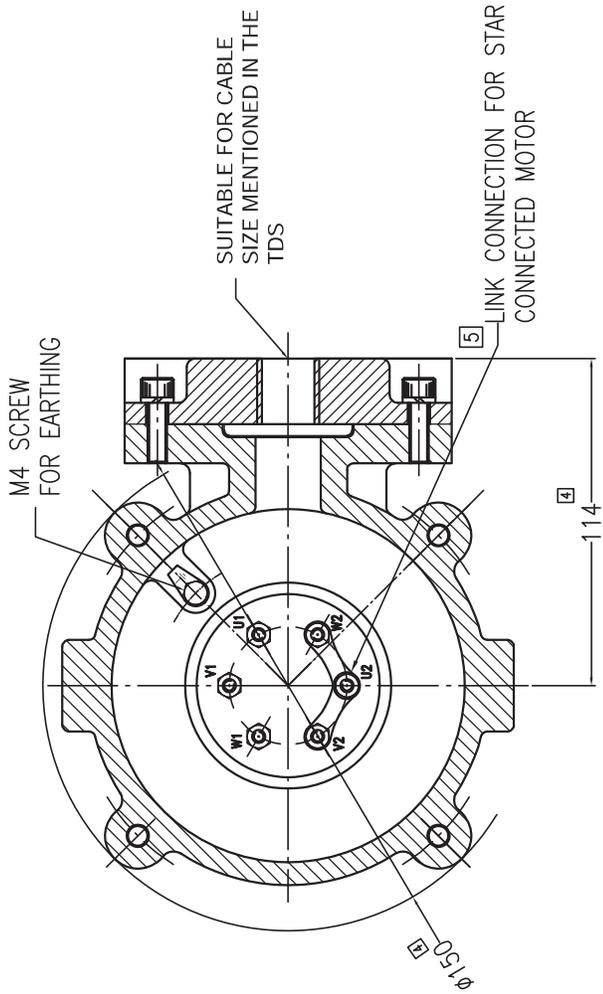
THERMAL WITHSTAND CURVE



Prep.: SK

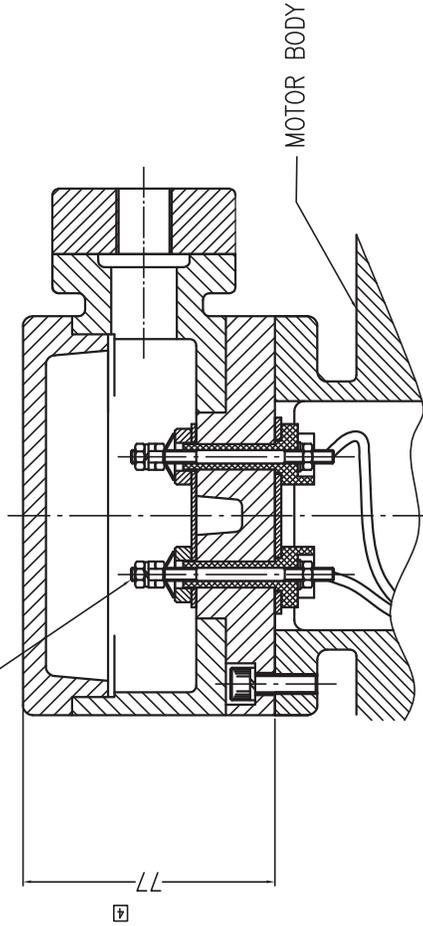
Date:

Revision:



VIEW AFTER REMOVAL OF TERMINAL BOX COVER

M4 6 Nos. TERMINALS



NOTE:-

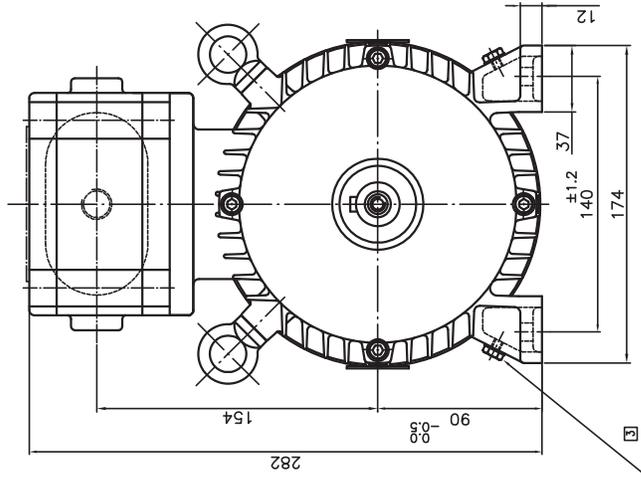
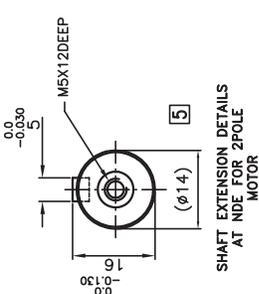
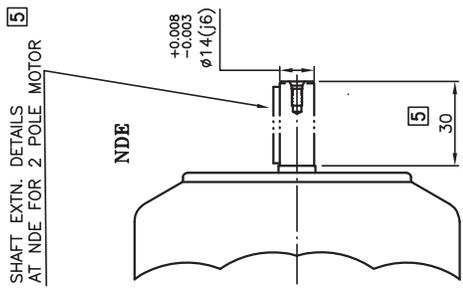
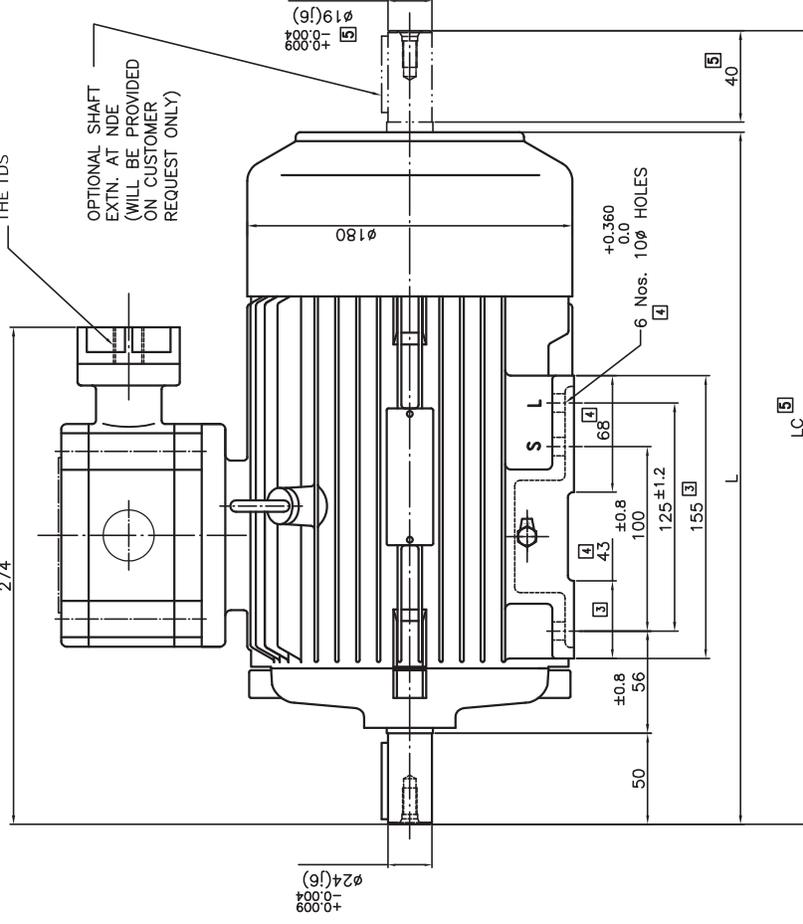
REFERENCE GENERAL CONSTRUCTION DETAILS DRG. No. 80F-HEM-GA-01 FOR 80 FLP & DRG. No. 90F-HEM-GA-01 FOR 90 FLP.

SYMBOL	SYMBOL	DATE	BY
5	5	31-7-18	KRW
4	4	11-04-15	P.N.RAOE
3	3	27-07-15	SAURABH
<p>FRAME SIZE 63-71 WAS 80-90 IN TITLE BLOCK, AND SEPARATE DRAWING MADE FOR 63-71FLP HAVING DRG. No. 24-06-044-0016 VIEW INCLUDED FOR DELTA CONNECTED MOTOR AND STAR CONNECTED SPECIFIED FOR EXISTING VIEW & NOTE ADDED.</p> <p>OVERALL DIMENSIONS, NOTE & STANDARD SPECIFIED IN TITLE</p> <p>DRAWING REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. NO. & ALL THE FEATURES.</p>			
<p>SCALE NTS</p> <p>SHT 1/1</p> <p>FRAME SIZE 80-90</p> <p>REV. 5</p> <p>DRG. NO.: 33-06-044-0001</p> <p>REF.: 63-71FLP-TBOX-ASSY</p>			
<p>TITLE 4 STANDARD TERMINAL BOX ASSEMBLY</p> <p>FLAMEPROOF MOTOR</p>			
<p>PROJECTION</p>		<p>DATE 28-11-12</p> <p>NAME NIMKAR</p>	
<p>DRN. S.P.JADIA</p> <p>CHD. S.P.JADIA</p> <p>APPD. S.P.JADIA</p>		<p>DATE 28-11-12</p> <p>NAME S.P.JADIA</p>	

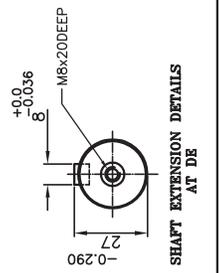
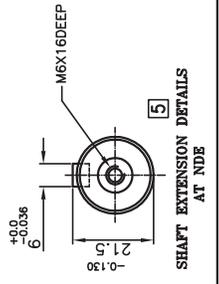
<p>All dimensions in mm unless otherwise specified.</p>	
NO MACHINING	~
ROUGH MACHINING	∇
SMOOTH MACHINING	▽▽
FINE MACHINE/GRIND	▽▽▽
POLISH/HONE/LAP	▽▽▽▽
<p>MACHINING SYMBOLS</p>	



SUITABLE FOR CABLE SIZE MENTIONED IN THE TDS



FRAME	MOTOR TYPE	POLE	L	LC
90S	FD1, FE2, FE3	2	380	415
		4, 6, 8		425
FRAME	MOTOR TYPE	POLE	L	LC
90L	FD1, FE2, FE3	2	380	415
		4, 6, 8		425
	FE3	2(2.2KW)	410	445
	FE2, FE3	4, 6, 8		455



5	NDE SIDE SHAFT EXTN. DIA. 18x40LG. WAS DIA. 24x50LG. & DIMS. 410, 415, 425, 445, 455 WAS 435 AS PER VERBAL INSTRUCTIONS RECD. FROM M. SANJAY JADIA CONSIDERING TO PROPOSED MECHANICAL DIMS. CHART - IE2 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE & 2 POLE MOTOR VIEW ADDED	LANKESH	30-01-20
4	PROVISION FOR 90S FRAME HOLES MADE ON FEET AT DIMN. 100, 6 HOLES WAS 4 HOLES DIMN. 68 WAS 43, FRAME 90S/L FLP WAS 90FLP IN TITLE.	NIMIKAR	25-3-16
3	DIMN. 274 WAS 260. M6 EARTHING SCREW INDICATED. DIMN. 43 & 155 ADDED.	SAURABH	27-8-15
2	DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES	NIMIKAR	25-9-14
h Hindustan ELECTRIC MOTORS OVERALL DIMENSIONS DRAWING B3 MOUNTING/TEFC/STD. FLAMEPROOF MOTOR		SCALE	NTS
TITLE DRG. NO.: F-90-0-10 REF. : 90FLP-OADIM-B3		SHT	1/1
NAME P.N. RAOTE S.P. JADIA S.P. JADIA		PROJECTION	REV. 5
DATE 02-01-07 02-01-07 02-01-07		FRAME SIZE	90S/L
APPD. S.P. JADIA		FLP	4

Dim. without tolerance as per IS:2102, very coarse
 All dimensions in mm unless otherwise specified.

NO MACHINING	~
ROUGH MACHINING	∇
SMOOTH MACHINING	∇∇
FINE MACHINE/GRIND	∇∇∇
POLISH/HONE/LAP	∇∇∇∇

MACHINING SYMBOLS

No. of Phases			3	Reference Performance	IS:12615	
Frame Designation			80 FLP	Standard Enclosure	IS:60079-1	
Rated Output	kW	0.55	Protection IS:4691		IP 55	
	HP	0.75	Vibration Standard		IS:12075	
No. of Poles			4	Noise Standard	IS:12065	
Rated Voltage			V	415	Duty S1	
Rated Frequency			Hz	50	Insulation Class F	
Rated Current			A	1.3	Cooling IS:6362 IC411	
Rated Speed			rpm	1430	Terminal Box Details	
Rated Torque			kgm	0.37		
Efficiency	Full load	%	80.8	Terminal Size	M4	
	3/4 load	%	80.8	No. of Terminal	6	
	1/2 load	%	74.0	Max. cable size (Cu)	mm ² 1x3Cx2.5	
Power factor	Full load		0.73	Bearing Data	DE	6204ZZ
	3/4 load		0.66		NDE	6204ZZ
	1/2 load		0.53		Lubrication	Prelubricated
Temp. Rise (Res.)			°C	70	Life L10 (Direct coupled)	hrs. 50,000
Acceleration Time			sec.	-	Regreasing Time	hrs. -
Stator Connection			Y	Lifting Eyebolt IS:4190	-	
Tropicalised? (Yes/No)			Yes	Motor Weight (approx)	kg 29	
I_{st} / I_r			%	6.0	Rotor GD ²	kgm ² 0.0049
T_{st} / T_r			%	2.2	Ambient Temp.	°C 50
T_{po} / T_r			%	2.6	Overall Dimensions of Packed motor (LxBxH) (mm)	
Locked rotor withstand time			Hot sec	6	-	
			Cold sec	14	Voltage Variation ±	% 10
					Frequency Variation ±	% 5
					Combiend Variation ±	% 10

Remarks: (1) Efficiency Class : IE3 (6) Permissible Fault Level: 50KA for 0.25 sec
 (2) Motor construction: TEFC (7) No. of Hot/Cold Starts: 3/3
 (3) Suitable Cable Gland & Lugs BY AVPL
 (4) Temp Class: T4 & Explosion Protection : Ex 'd'
 (5) Motor suitable for Gas Gr. IIA / IIB, Zone I & II
 (4) Minimum Starting Voltage : 80%

Data subject to tolerance as per IS:12615.

Prep.: Engg

Chkd.:

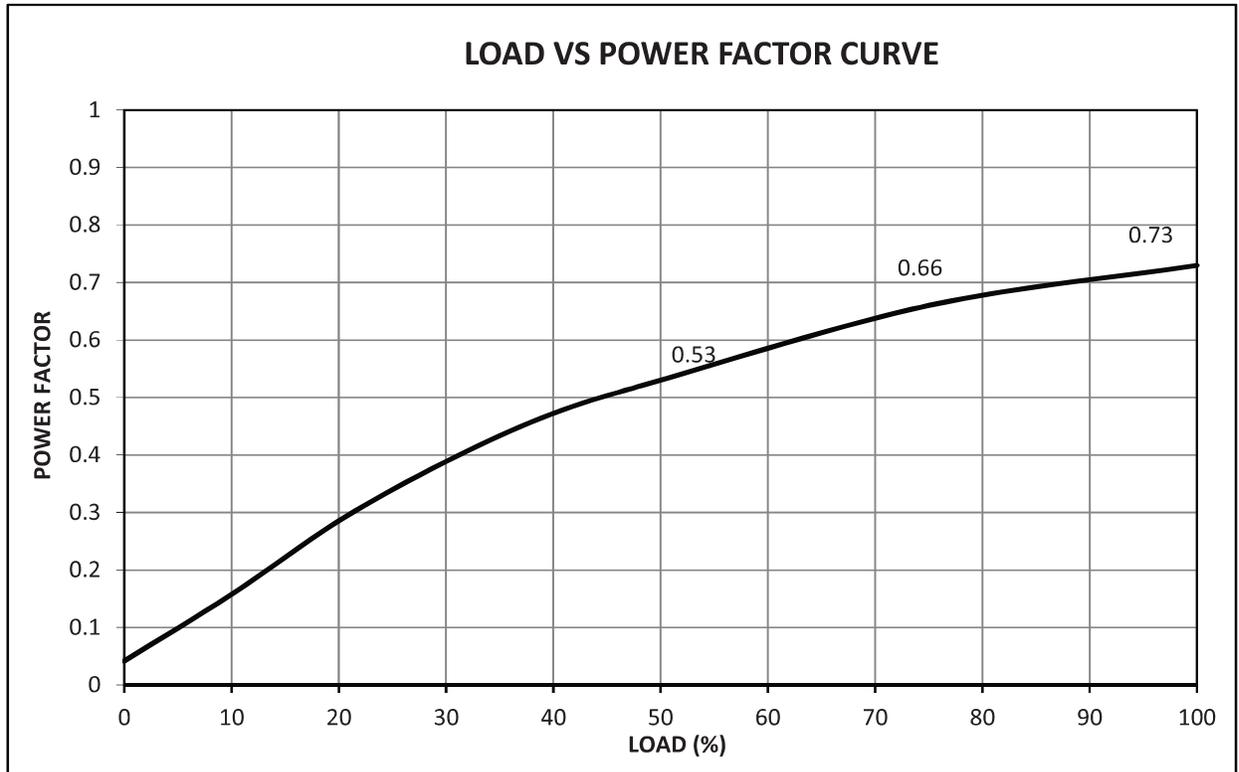
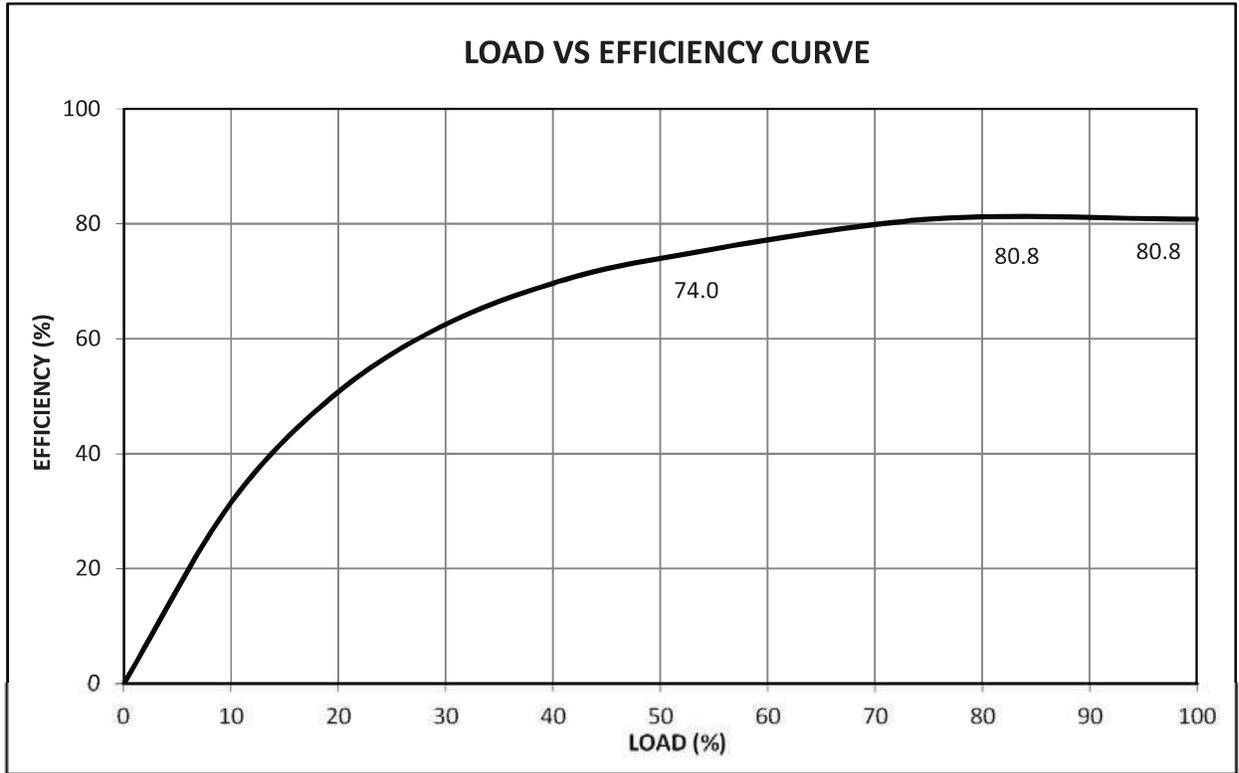
Date:

Date:

Rated Output (kW/HP) : 0.55/0.75

Poles : 4

Efficiency Class : IE3

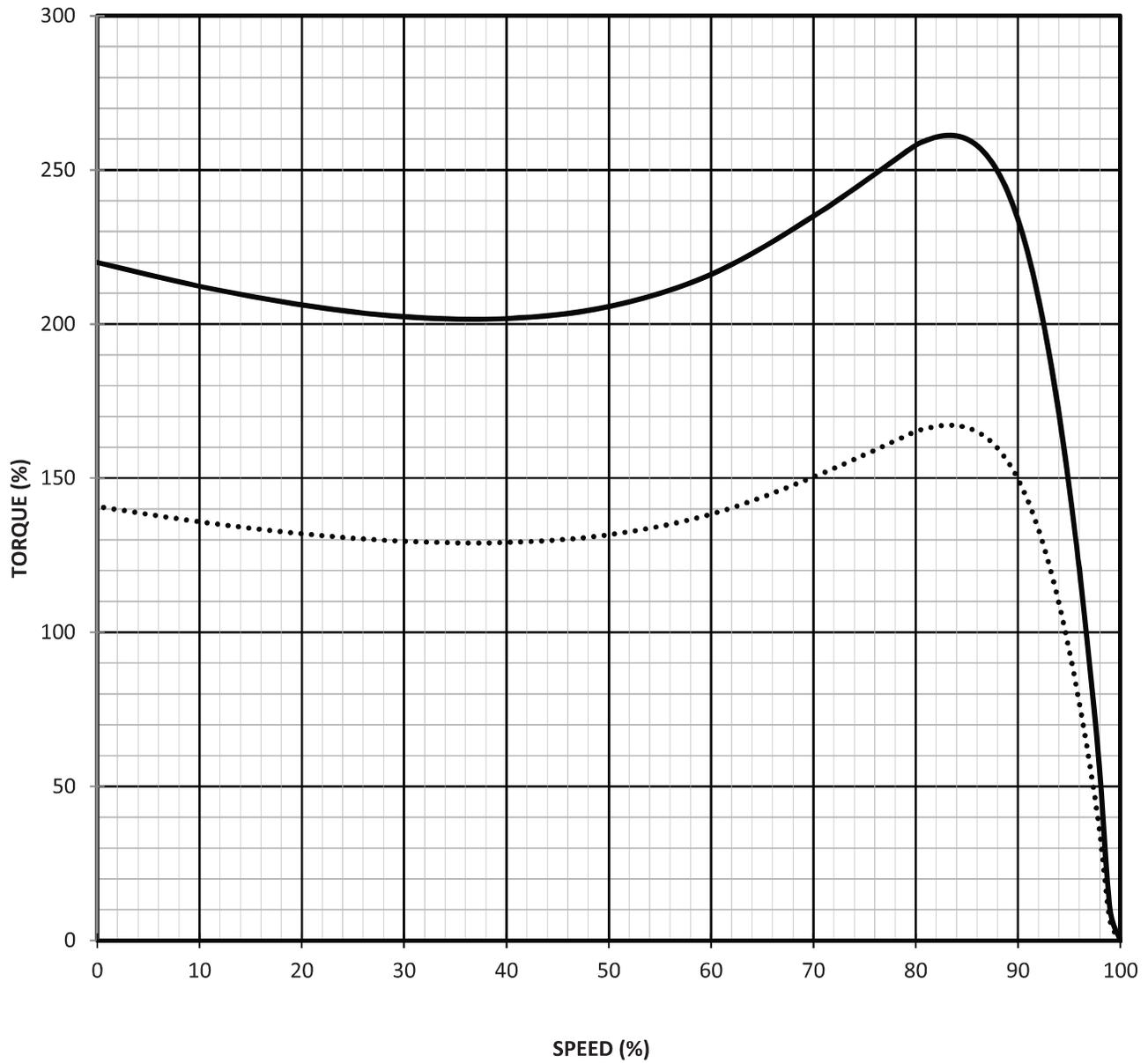


Rated Output (kW/HP) : 0.55/0.75

Poles : 4

Efficiency Class : IE3

TORQUE SPEED CURVE

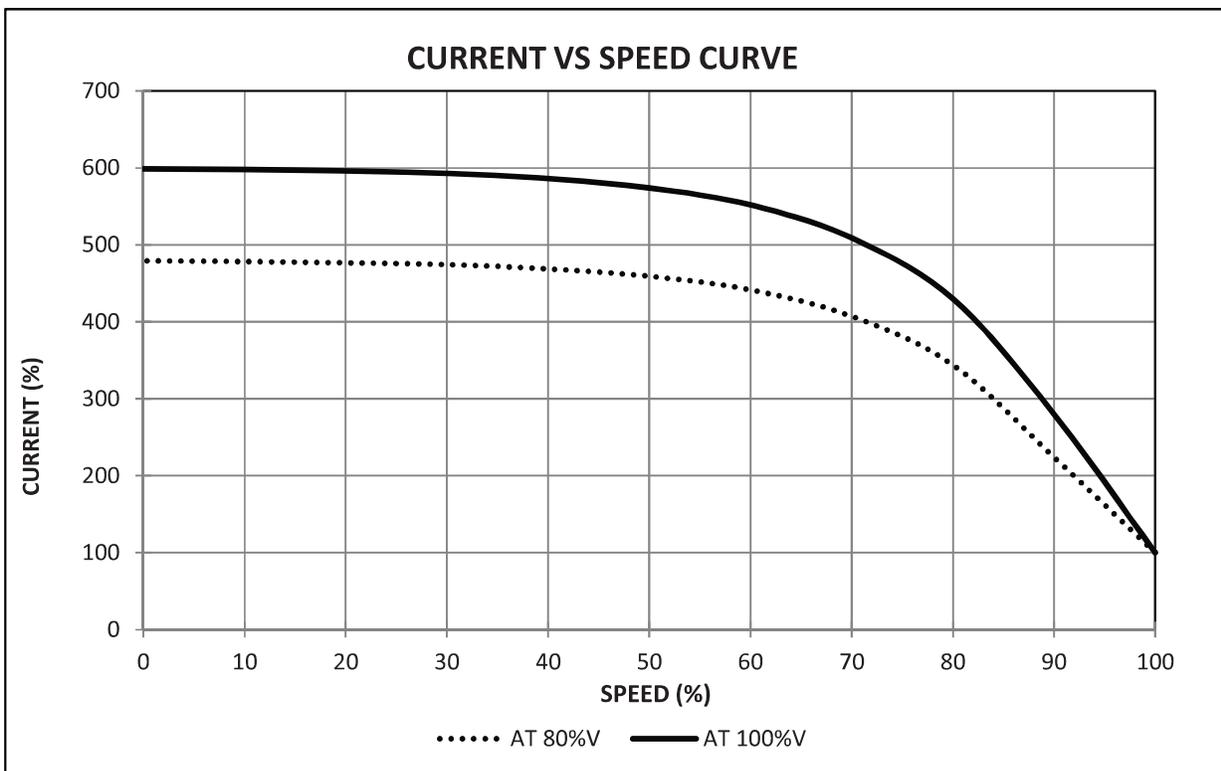
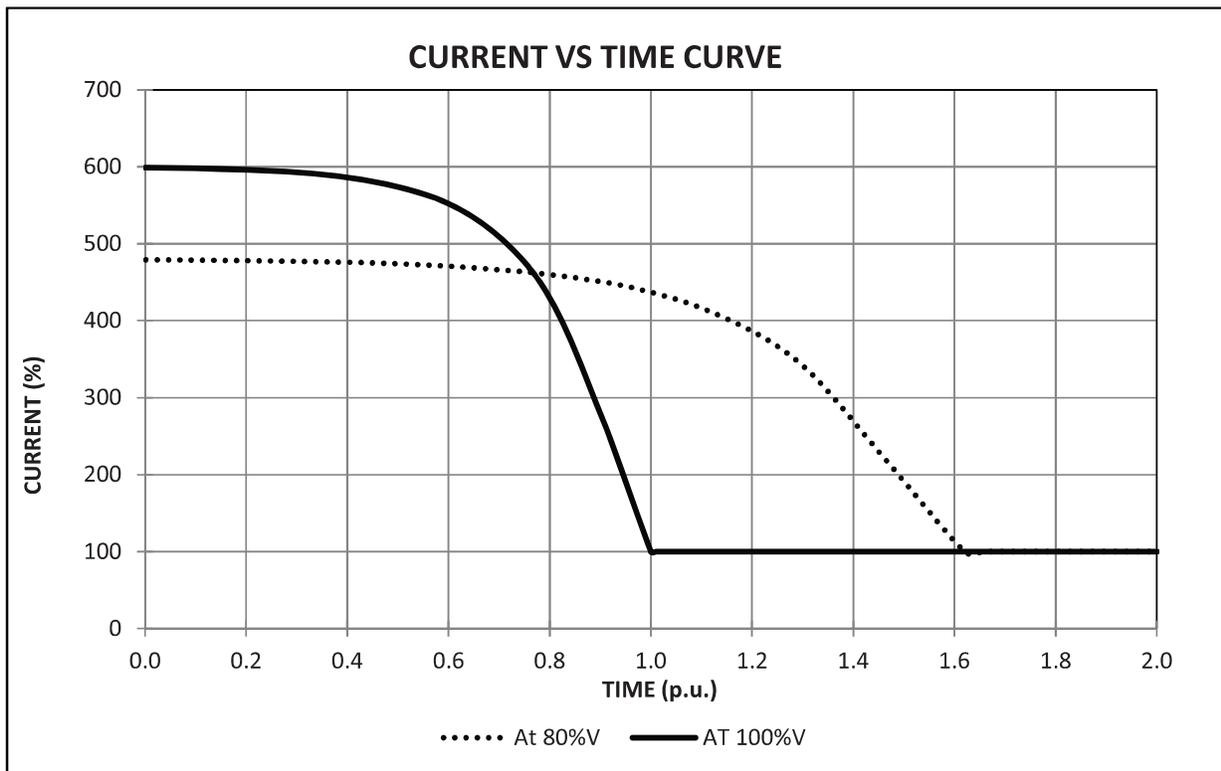


..... At 80%V ——— At 100%V

Rated Output (kW/HP) : 0.55/0.75

Poles : 4

Efficiency Class : IE3

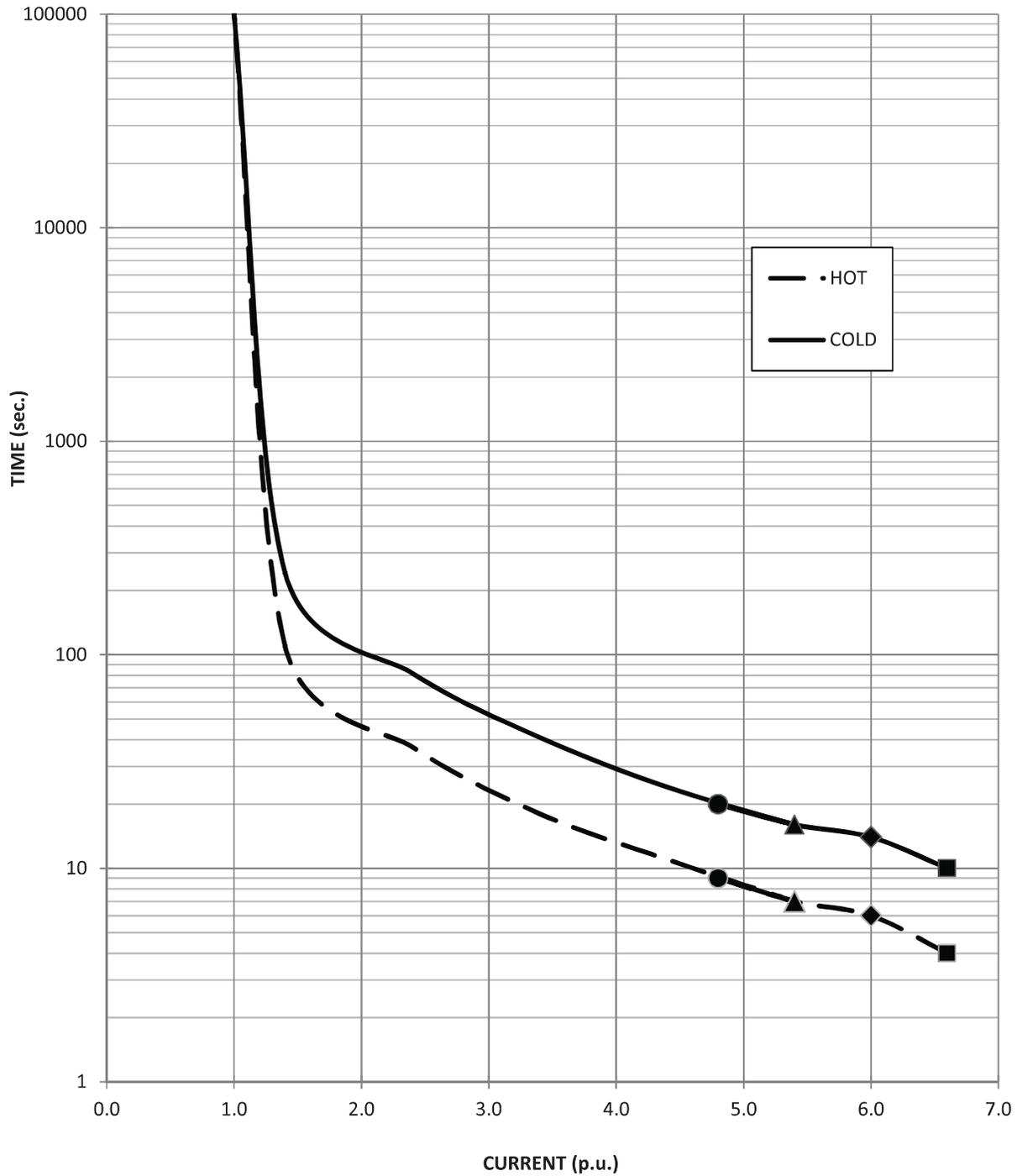


Rated Output (kW/HP) : 0.55/0.75

Poles : 4

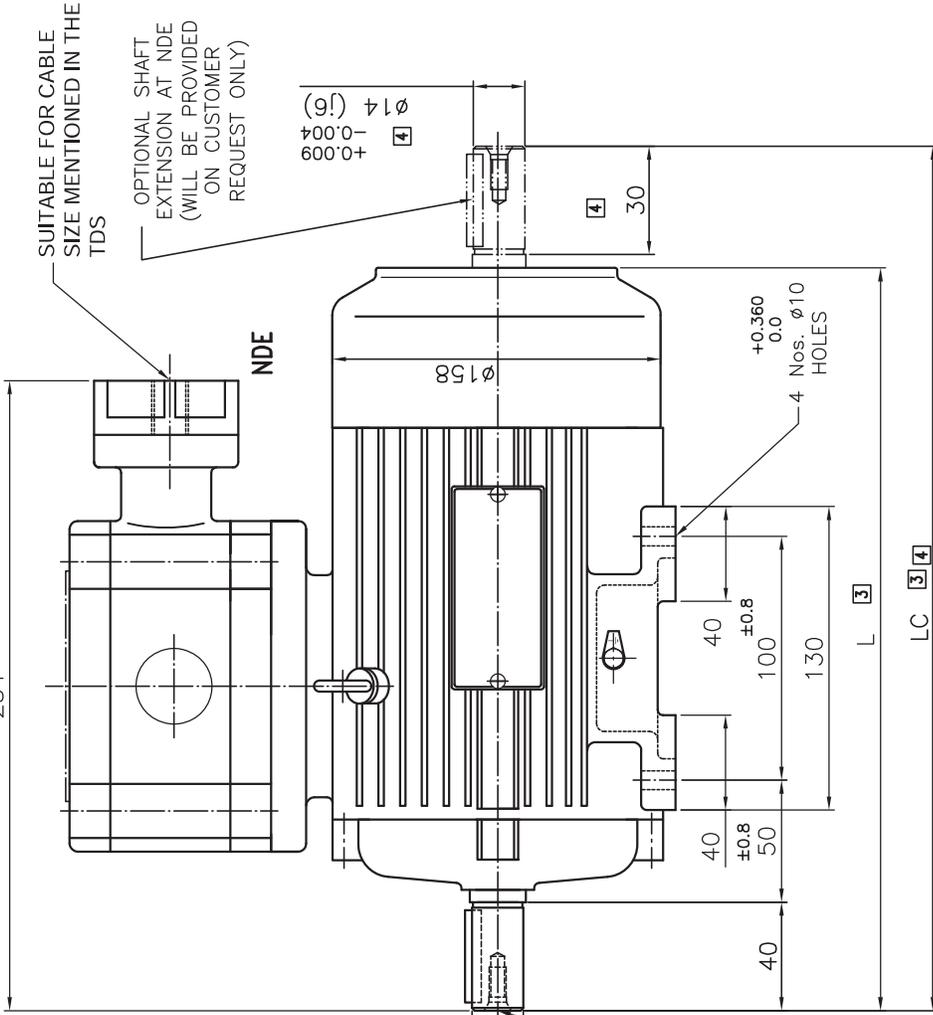
Efficiency Class : IE3

THERMAL WITHSTAND CURVE



At 110%V
 At 100%V
 At 90%V
 At 80%V

254



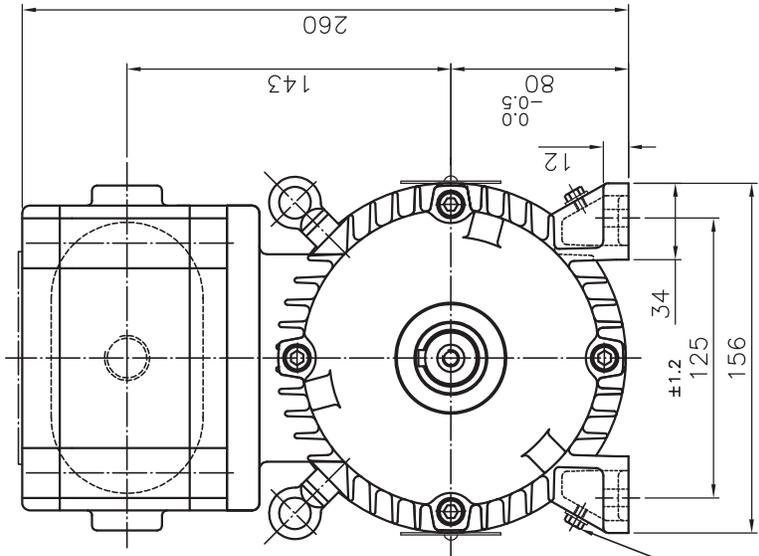
SUITABLE FOR CABLE SIZE MENTIONED IN THE TDS

OPTIONAL SHAFT EXTENSION AT NDE (WILL BE PROVIDED ON CUSTOMER REQUEST ONLY)

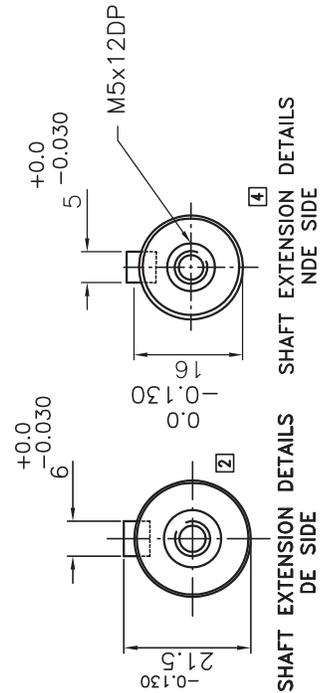
DE

ø19 (6)
+0.009
-0.004

M6x16DEEP



FRAME	TYPE DESIGNATION	POLE	L	LC
80	FD1, FE2, FE3	2, 4, 6, 8	313	348
	FE2, FE3		359	394



SHAFT EXTENSION DETAILS DE SIDE

SHAFT EXTENSION DETAILS NDE SIDE

NDE SIDE SHAFT EXTN. DIA.14x30LG. WAS DIA.19x40LG. & DIMS 359,394,348 WAS 358 AS PER VERBAL INSTRUCTIONS RECD.FROM Mr. SANJAY JADIA CONSIDERING TO PROPOSED MECHANICAL DIMNS. CHART - IE2 AND IE3 MOTORS FOR TECHNICAL SPECIFICATION CATALOGUE & SHAFT EXTN. DETAILS VIEW ADDED FOR NDE SIDE & TYPE DESIGNATION TABLE ADDED, TO UPLOAD THIS DRG. ON PORTAL

3 DIMN. 313, 358 WAS 310, 355, TO SUIT PRESENT COWL LENGTH 80 WAS 77

2 DIMN. 254 WAS 240. TAPPING SHOWN IN SHAFT EXTN. DETAILS.

1 DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES

REV	DATE	BY
1	18-01-07	S.P.JADIA
2	18-01-07	S.P.JADIA
3	18-01-07	S.P.JADIA



TITLE		SCALE	NTS
OVERALL DIMENSIONS DRAWING FOR B3 MOUNTING, TEFC, FLAMEPROOF MOTOR		SHT	1/1
PROJECTION	DRG. NO.:	FRAME SIZE	80
	F-80-0-10	FLP	
APPD.	DATE	REV.	4
S.P.JADIA	18-01-07		
S.P.JADIA	18-01-07		
REF : 80FLP-0ADIM-B3			

No. of Phases		3	Reference Standard		IS:12615	
Frame Designation		90S	Protection IS:4691		IP 55	
Rated Output	kW	0.75	Vibration Standard		IS:12075	
	HP	1.0	Noise Standard		IS:12065	
No. of Poles		6	Duty		S1	
Rated Voltage	V	415	Insulation Class		F	
Rated Frequency	Hz	50	Cooling IS:6362		IC411	
Rated Current	A	1.9	Terminal Box Details	Type	HM2GN	
Rated Speed	rpm	930		Terminal Size	M4	
Rated Torque	kgm	0.79		No. of Terminal	6	
Efficiency	Full load	%		78.9	Max. cable size (Cu) mm ²	1x3Cx2.5
	3/4 load	%	78.9	DE	6205ZZ	
	1/2 load	%	74.0	NDE	6205ZZ	
Power factor	Full load		0.70	Bearing Data	Lubrication	Prelubricated
	3/4 load		0.68		Life L10 (Direct Coupled) hrs.	50,000
	1/2 load		0.63		Regreasing Time hrs.	-
Max. Temp. Rise (Res.)	°C	70	Lifting Eyebolt		-	
Acceleration Time	sec.	-	Motor Weight (approx)		kg 15.0	
Stator Connection		Y	Rotor GD ²		kgm ² 0.0135	
Tropicalised? (Yes / No)		Yes	Ambient Temp.		°C 50	
I_{st} / I_r		7.0	Overall Dimensions of Packed motor (LxBxH) (mm)			
T_{st} / T_r		2.6				
T_{po} / T_r		2.6				
Locked rotor withstand time	Hot	sec.	6	Voltage Variation ± % 10		
	Cold	sec.	14	Frequency Variation ± % 5		
				Combiend Variation ± % 10		

Remarks: (1) Efficiency Class : IE3
(2) Motor Construction : TEFC
(3) Suitable Cable Gland & Lugs BY AVPL
(4) Minimum Starting Voltage : 80%
(5) Permissible Fault Level: 50KA for 0.25 sec
(6) No. of Hot/Cold Starts: 3/3

Data subject to tolerance as per IEC 60034-1

Prep.: Engg

Chkd.:

Date:

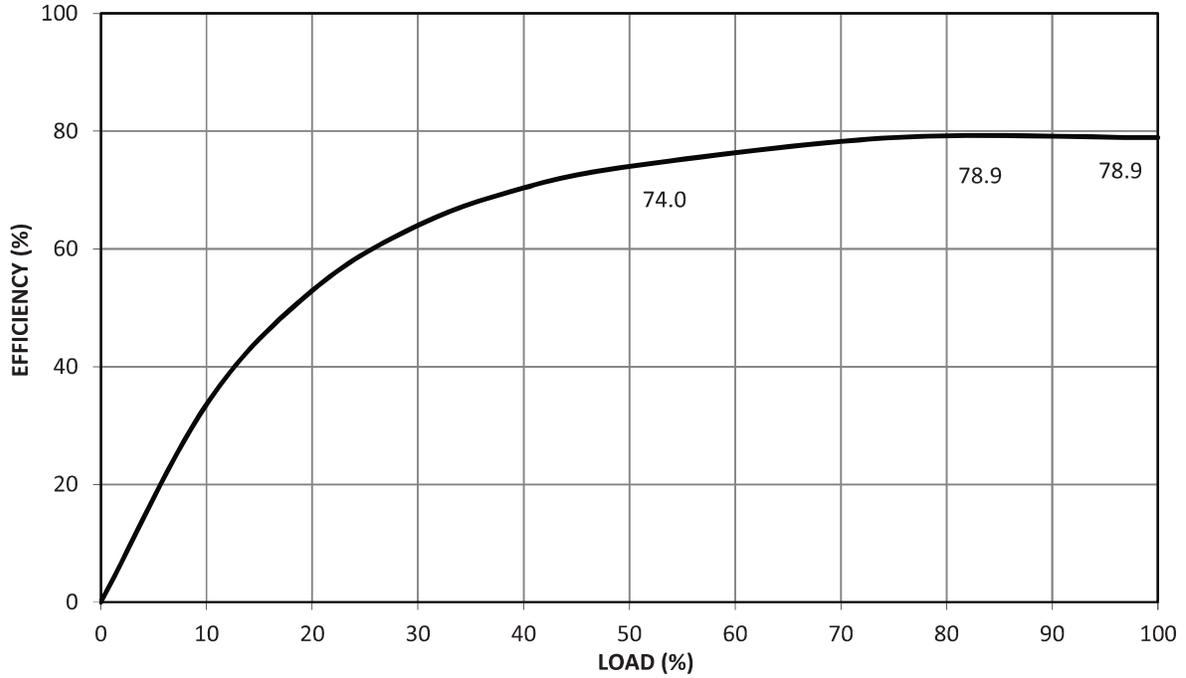
Date:

Rated Output (kW/HP): 0.75/1.0

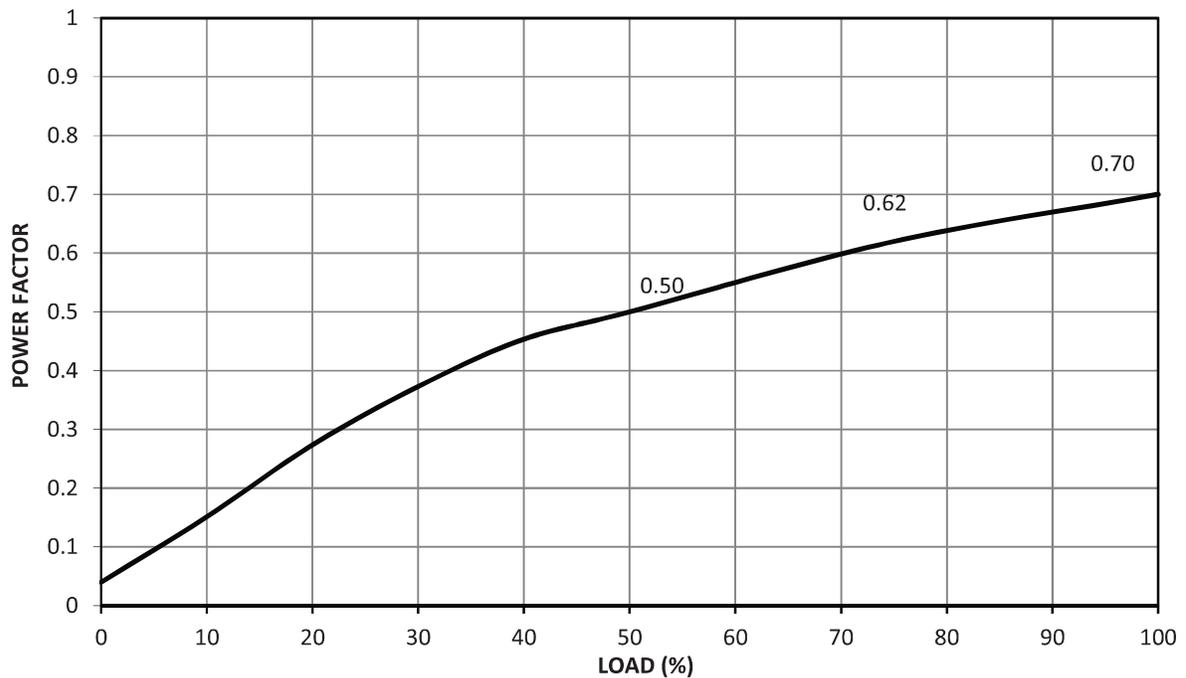
Poles: 6

Efficiency Class: IE3

LOAD VS EFFICIENCY CURVE



LOAD VS POWER FACTOR CURVE

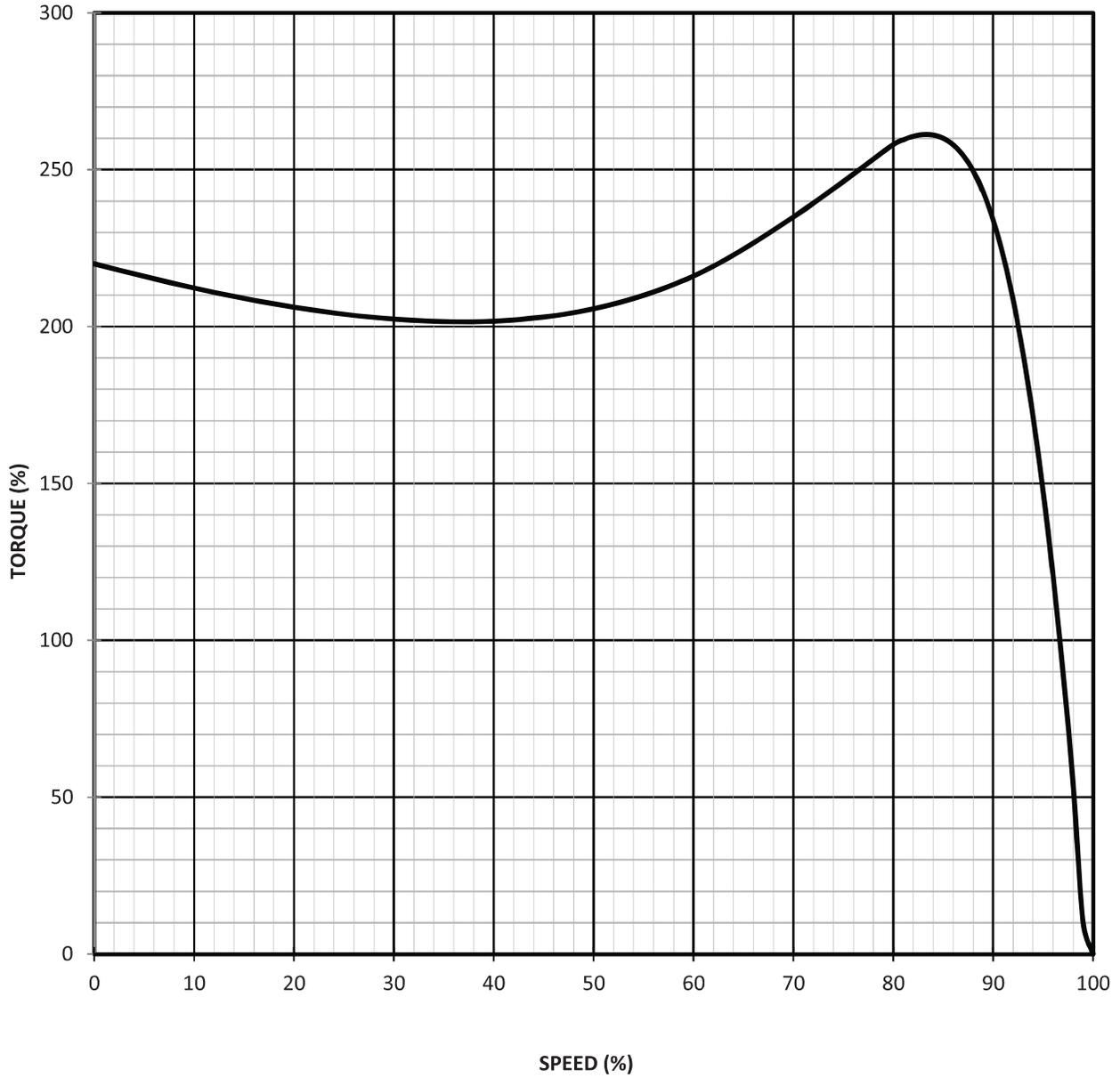


Rated Output (kW/HP) : 0.75/1.0

Poles : 6

Efficiency Class : IE3

TORQUE SPEED CURVE



Prep.:

SK

Date:

3/26/2021

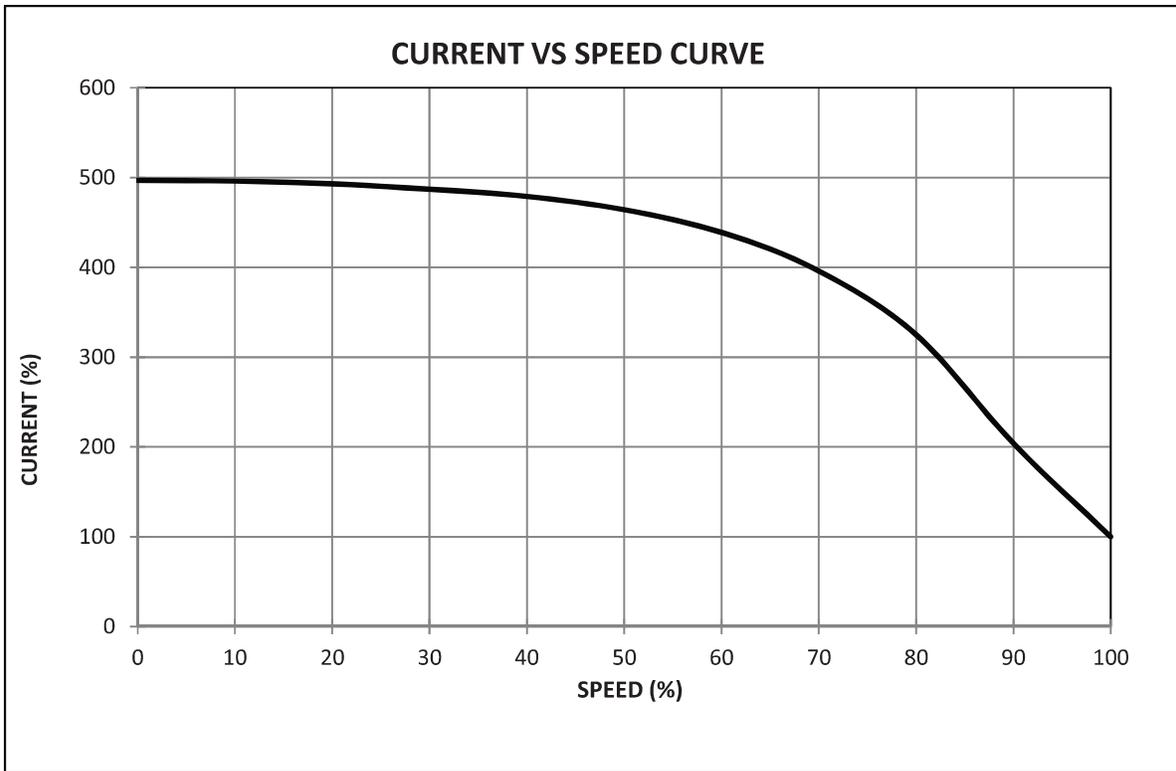
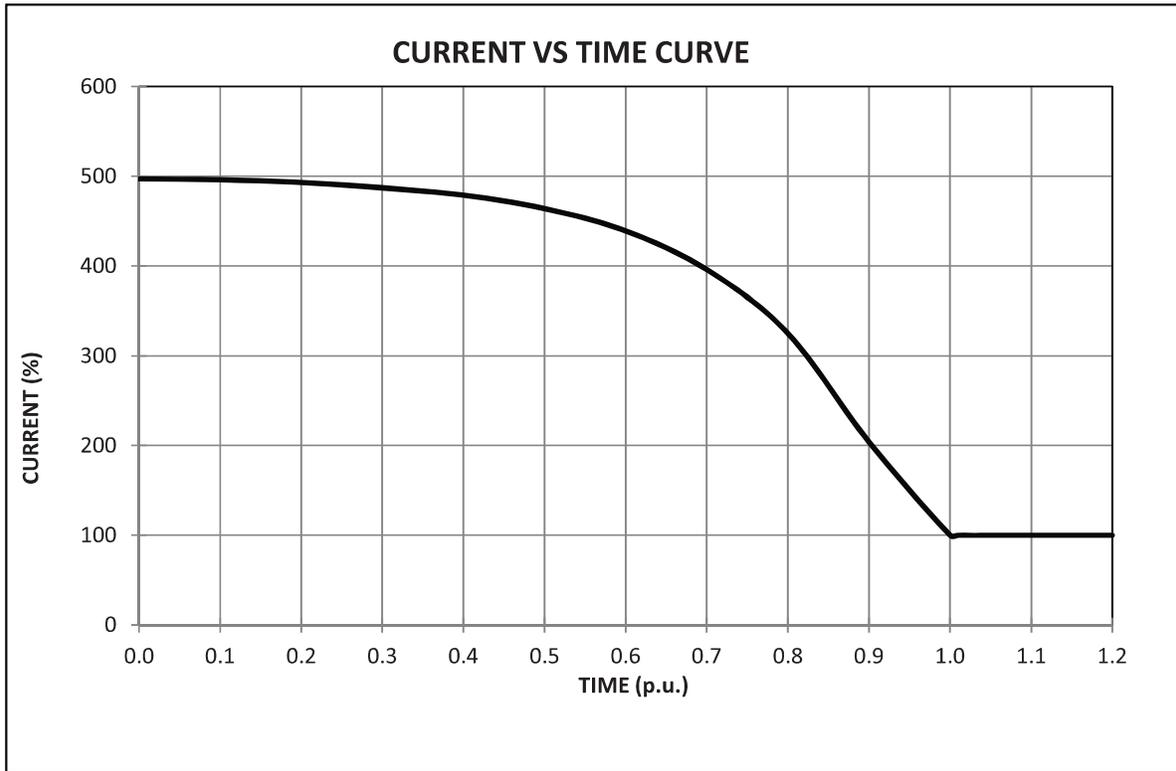
Revision:

-

Rated Output (kW/HP) : 0.75/1.0

Poles : 6

Efficiency Class : IE3

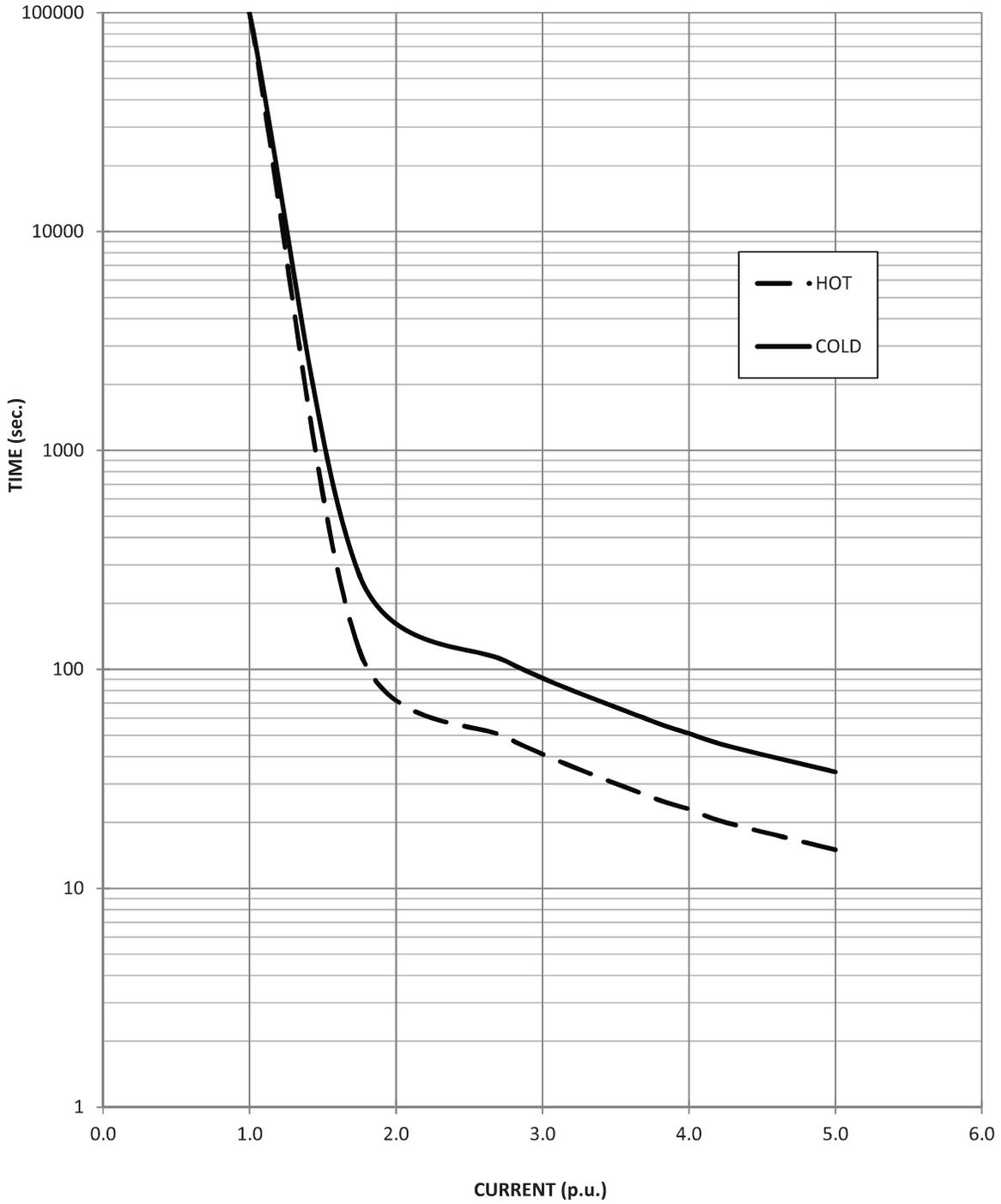


Rated Output (kW/HP) : 0.75/1.0

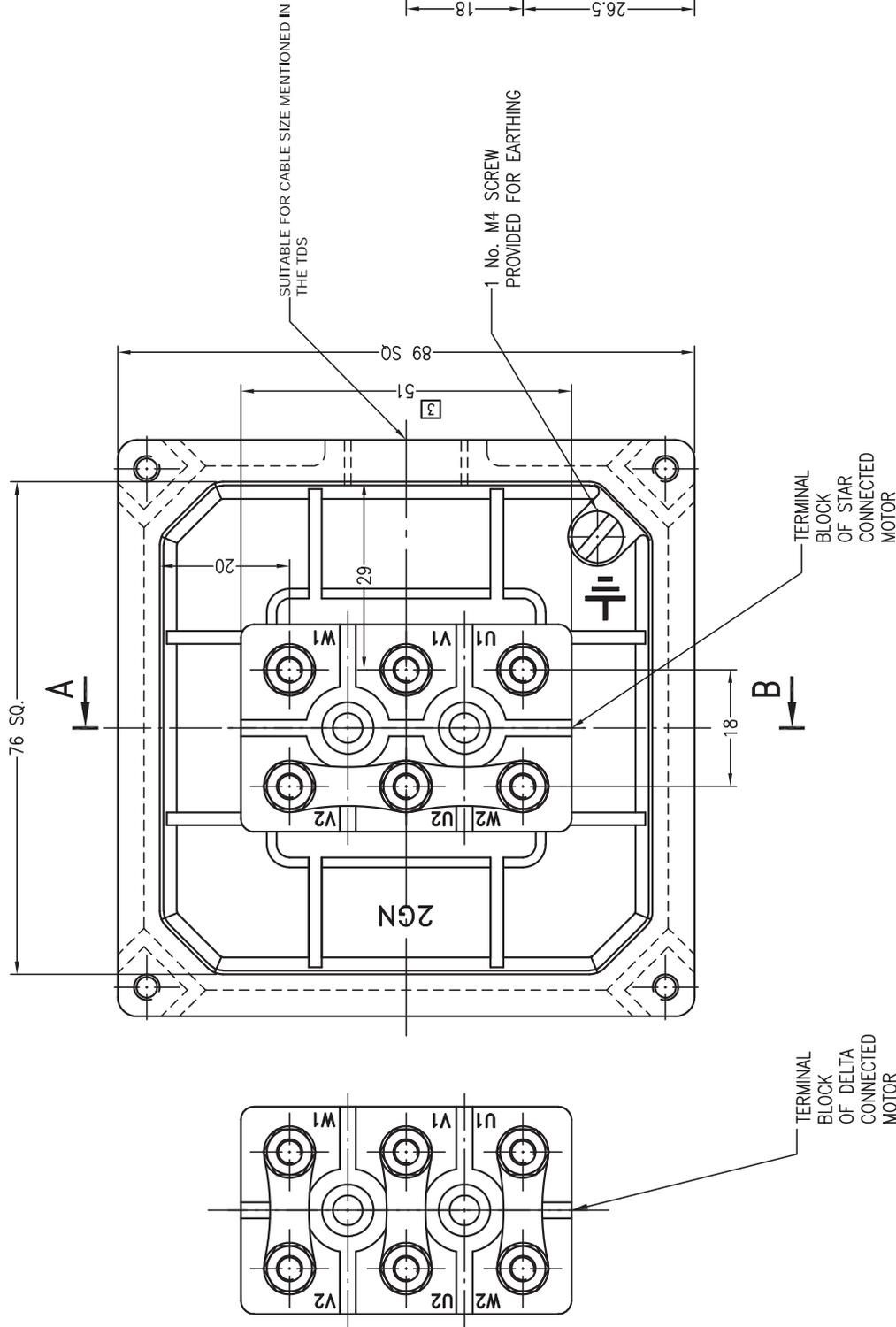
Poles : 6

Efficiency Class : IE3

THERMAL WITHSTAND CURVE



Section AB



REV. STATUS	3	TERMINAL BLOCK DIMN. 51 WAS 68 LG. [TERMINAL BLOCK AS PER DRG. No. A4-56/100-17(3C) WAS
	2	TERMINAL BLOCK DRG. No. A4-56/090-17] DIMN. 29 REMOVED & DIMN. 6 WAS 6.5
	1	DRG. REDRAWN ON NEW GAD DRG. SHEET FORMAT BY KEEPING THE SAME DRG. No. & ALL THE FEATURES.
TITLE STD. TERMINAL BOX ASSEMBLY		
PROJECTION	DATE	REV.
DRN.	NAME	FRM. SIZE
CHD.	GANESH	63-90
APPD.	16-07-11	(GN)
		REF: TB-ASLY-63-90

Dim. without tolerance as per IS:2102 very coarse	NO MACHINING	~
All dimensions in mm unless otherwise specified.	ROUGH MACHINING	∇
	SMOOTH MACHINING	∇∇
	FINE MACHINE/GRIND	∇∇∇
	POLISH/HONE/LAP	∇∇∇∇
	MACHINING SYMBOLS	

SCALE	NTS
SHT	1/1
NIMKAR	01/10/16
NIMKAR	11/11/14

**DATA SHEET OF 3 PHASE INDUCTION MOTOR**

Customer : Advance Ventilation Pvt. Ltd. Enquiry / INDENT NO : NMPI906861/1600 (Dated: 02/26/2019)

Frame	ND225S	Rated Output (kW)	37
Voltage (V)	415 +-10%	Rated Current (A)	64.00
Rated Speed (RPM)	1475	No of poles	4
Frequency (Hz)	50 +-5%	Duty	S1
Method of Cooling	IC411	Degree of Protection	IP55
Gas Group	Not applicable	Mounting	B3
Temp Class	T3		
Enclosure	TEFC Safe Area		

Load	100% Load	75% Load	50% Load
Efficiency	IE3 - 93.9 %	93.9 %	93 %
Power factor	0.86	0.82	0.74
AMB, Temp/Temp rise	50°C/70°C (By Resistance Method)		
Insulation class	F (Temp. rise limited to class 'B')		
Rated Torque (kg-m)	24.42		
Locked rotor current % FLC	700		
Starting torque % FLT	225		
Pull out torque % FLT	275		
Pull Up torque % FLT	220		
Life Of Beraing	40000 Hours greased For Life		
Method of starting	Direct On Line		
Winding connections	Delta		
No of terminals	6		
Direction of rotation	Bidirectional		
Noise Level	As Per IEC Standard		
Motor GD Sq. (kg-m ²)	3.53		
Load GD Sq. (kg-m ²)	3.02		
Starting time @100% V (Sec)	0.3		
Locked rotor Withstand time hot (Sec.)	12		
Locked rotor Withstand time cold (Sec.)	24		
Stator Thermal / Cooling time constant (min)	45 / 90		
Successive Cold / HotStart	3/2 When Load GD2=Motor GD2		
Terminal box position	RHS From DE		
Cable size	1*3C, 95 SQMM (AL)		
Bearing DE/ODE	6313-ZZ / 6213-ZZ		
Type of lubrication	Sealed Bearing. No Lubrication Required		
Shaft Material	EN8 OR C40	Stator Body Material	Cast Iron
Minimum Starting Voltage	80% Of The Rated When Load GD2= Motor GD2		
Net Weight (Approx.) kg	325		
Paint shade	As per approved painting schedule		
Applicable standards	IEC 60034		
Space heaters	SPACE HEATER 60WX1 (200/225)	Voltage: 220-240V	
Winding Resistance	0.118/0.124mΩ Per Phase and 0.079/0.083B/W Terminal		

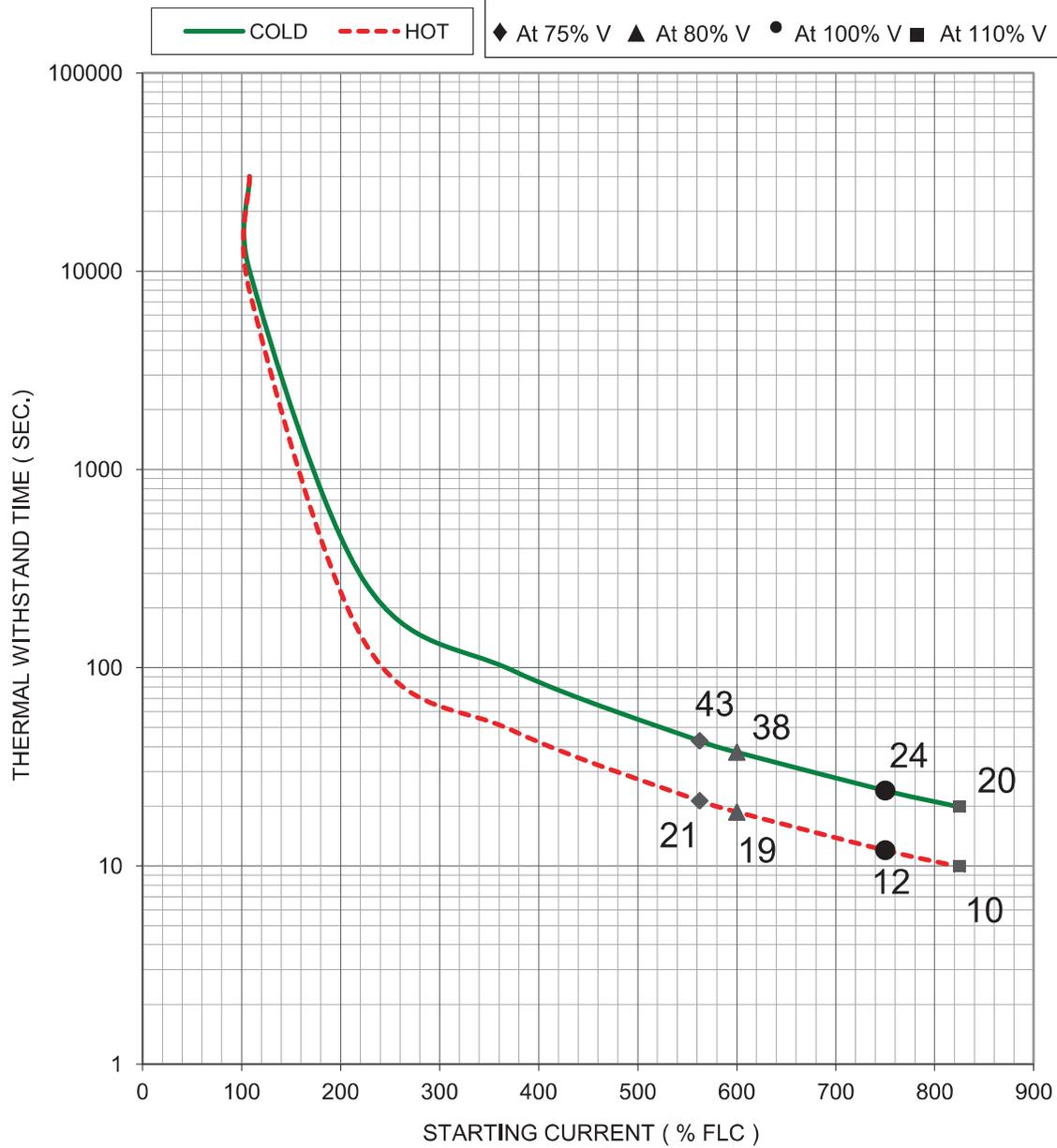
- (1) Suitable Cable Gland & Lugs BY AVPL
- (2) Minimum Starting Voltage : 80%
- (3) Permissible Fault Level: 50KA for 0.25 sec
- (4) No. of Hot/Cold Starts: 3/3

All performance data is subject to tolerance as per IEC 60034
 All performance shall be measured on sinusoidal supply
 Temp rise test shall be carried at rated kW & voltage for 1 hour other than S1 duty

Customer specific paint shade and paint thickness will not be applicable on powder coated components.

Issued By :	Dhruvajyoti Chakraborty
Date : 04/26/2019	LT Motors Division, Ahmadnagar

THERMAL WITHSTAND TIME CURVE



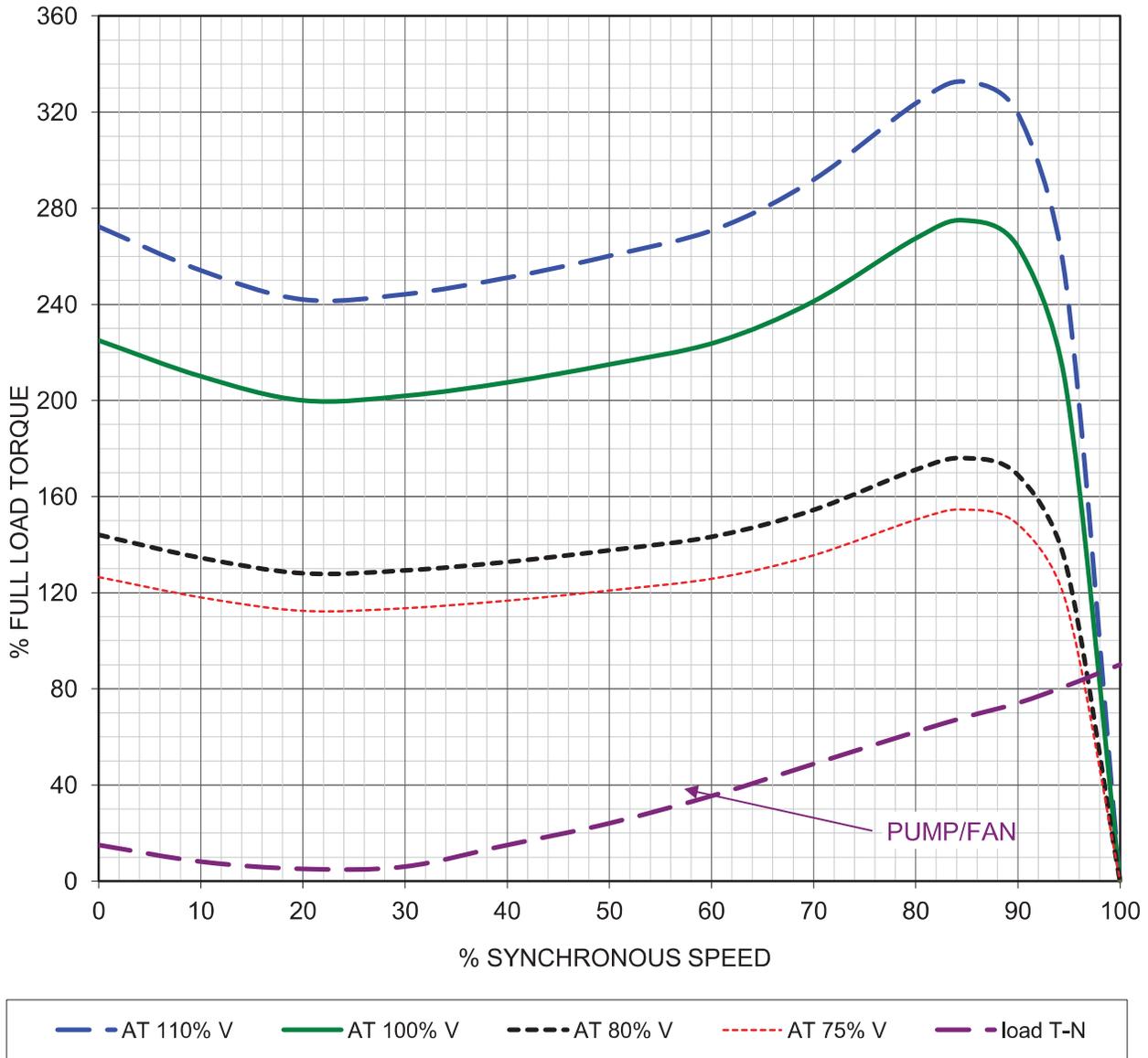
Curves are asymptotic to Y axis.

CUSTOMER	ADVANCE VENTILATION PVT. LTD.	RATED O/P kW	37
P.O.NO		NO OF POLES	4
IND.NO:	QNMVI22025/700	FRAME	ND225S
	NAME	DATE	TITLE
DRN	PLP	31-Jan-22	THERMAL WITHSTAND TIME CURVE
CHD	PLP	31-Jan-22	
APPROVED	RGV	31-Jan-22	
			SC12/24/750



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

SPEED VS TORQUE



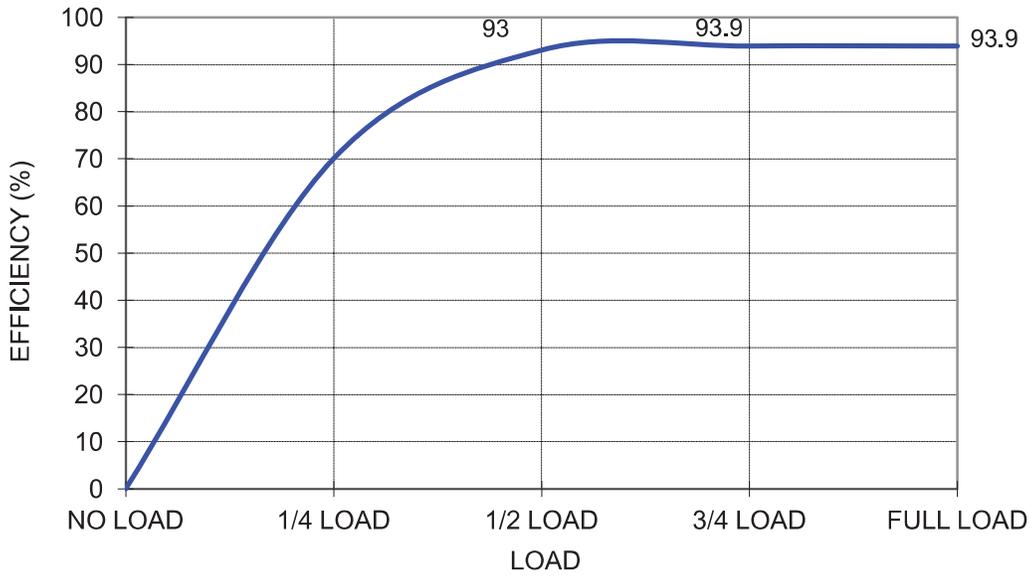
CUSTOMER	ADVANCE VENTILATION PVT. LTD.	RATED O/P kW	37
P.O.NO		NO OF POLES	4
IND.NO:	QNMVI22025/700	FRAME	ND225S

	NAME	DATE	TITLE
DRN	PLP	31-Jan-22	SUPERIMPOSED TORQUE SPEED CURVE SC225/750
CHD	PLP	31-Jan-22	
APPROVED	RGV	31-Jan-22	

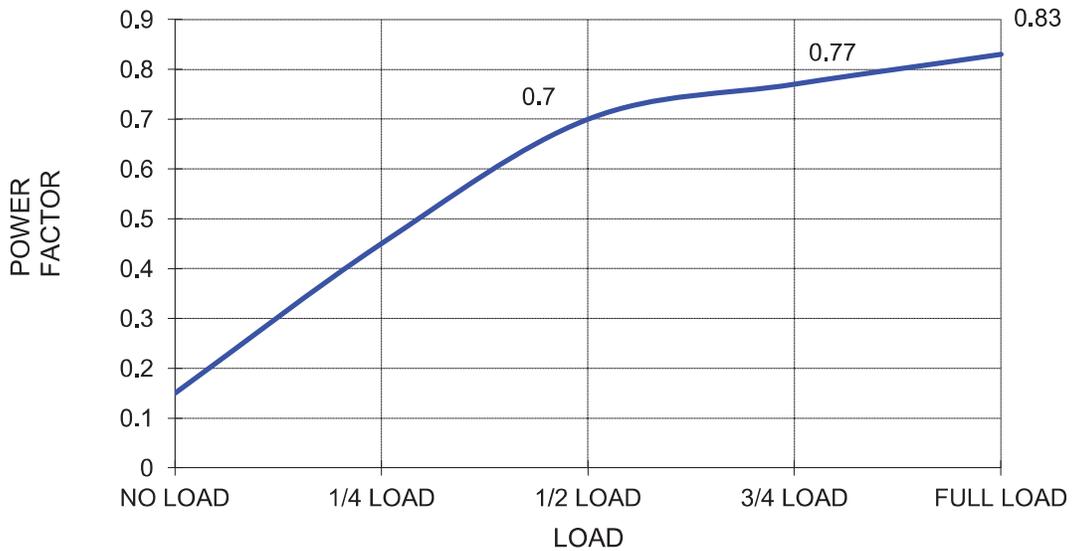


CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

LOAD Vs EFFICIENCY



LOAD Vs POWER-FACTOR



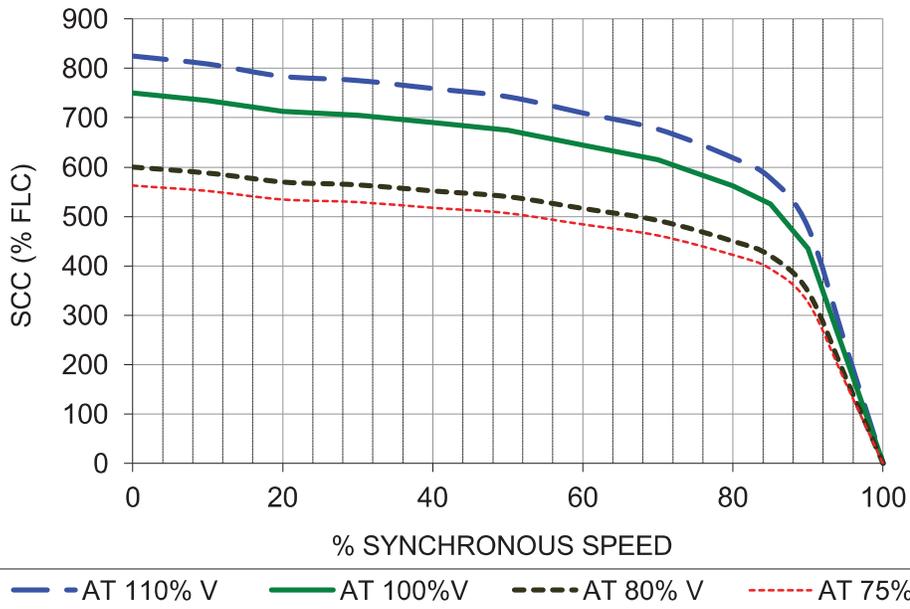
CUSTOMER	ADVANCE VENTILATION PVT. LTD.	RATED O/P kW	37
P.O.NO		NO OF POLES	4
IND.NO:	QNMVI22025/700	FRAME	ND225S

	NAME	DATE	TITLE
DRN	PLP	31-Jan-22	LOAD Vs EFFICIENCY & POWER FACTOR CURVE SC93.90/0.83
CHD	PLP	31-Jan-22	
APPROVED	RGV	31-Jan-22	

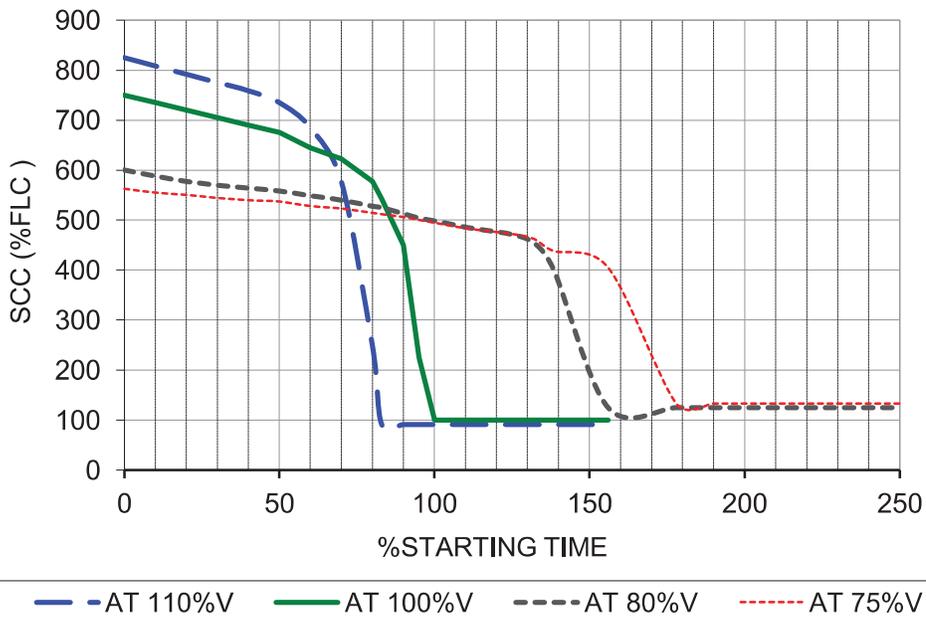


CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

SPEED Vs CURRENT



TIME Vs CURRENT



CUSTOMER	ADVANCE VENTILATION PVT. LTD.	RATED O/P kW	37
P.O.NO		NO OF POLES	4
IND.NO:	QNMVI22025/700	FRAME	ND225S

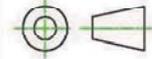
	NAME	DATE	TITLE
DRN	PLP	31-Jan-22	CURRENT SPEED & CURRENT TIME CURVE SC1475/100
CHD	PLP	31-Jan-22	
APPROVED	RGV	31-Jan-22	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

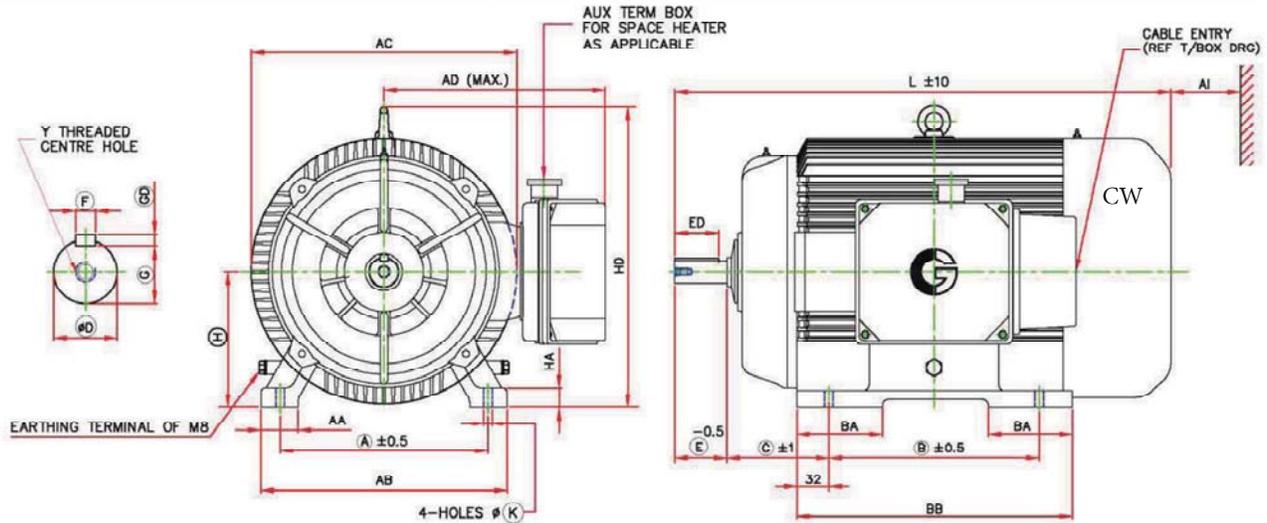
DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC INDUCTION MOTOR

PROJECTION



DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	A1**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND225S	356	286		149	225,0 / 224,5	70	425	102	350	19,0 / 19,5	400	470	830	534	25	325	110

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
60.030 / 60.011	140	110	18.00 / 17.957	11.0 / 10.9	53.0 / 52.8	M20X40

- NOTES**
- TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
 - ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
 - MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
 - **MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm

RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

Rev. 1 Dt:

Rev. 2 Dt:

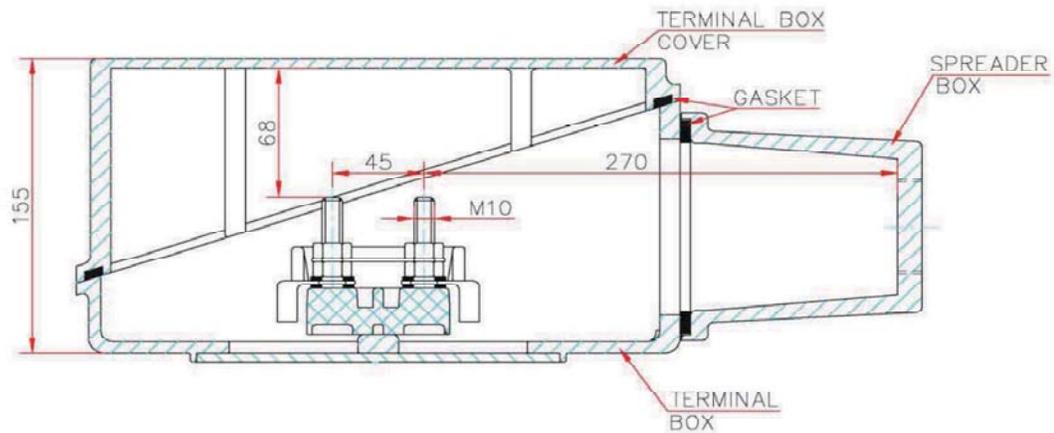
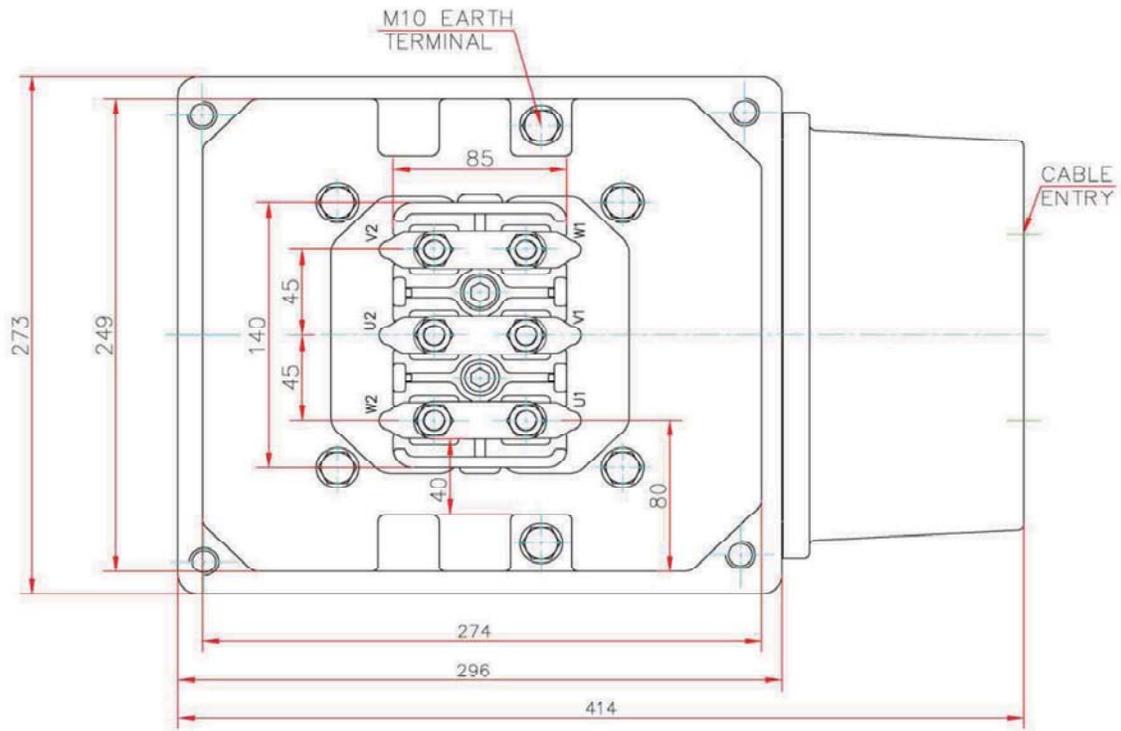
CUSTOMER	ADVANCE VENTILATION PVT. LTD.	RATED O/P KW	37	NO OF POLES	4
P.O. NO.		FRAME	ND225S	MAIN CABLE SIZE	1 * 3C,35-MM ²
IND. NO.	QNMVI22025/700	MOUNTING	B3 (HORIZONTAL FOOT)		
	NAME	DATE	REMARKS	TITLE	
DRN	SBK	31-Jan-22		DIMENSIONAL DRAWING	
CHD	SBK	31-Jan-22			
APPROVED	SSN	31-Jan-22			

CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DRG NO

QNMVI22025/700-ND225S

REV 0



CREEPAGE = 25
CLEARANCE = 13

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER	THERMISTOR	RTD	TB Construction
APPLICABLE	YES	NA	NA	IP55
CABLE SIZE (ENTRY)	1 * 3C, 2.5-MM ² (M20 x 1.5F)		NA	Fault Level
MAIN CABLE SIZE	1*3C, 95 SQMM (AL)	CABLE ENTRY	SUITABLE FOR CABLE SIZE	50kA for 0.25sec
CUSTOMER	ADVANCE VENTILATION PVT. LTD.		RATED O/P kW	37
PO No			NO OF POLES	4
INDENT / ENQ No	QNMVI22025/700		FRAME	ND225S
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED	
DRAWN BY	SBS	31-01-2022	TITLE : TERMINAL BOX ARRANGEMENT	
CHECKED BY	SBK	31-01-2022		
APPROVED BY	SA	31-01-2022		



CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

EA9256R2

DRG No :

61911101

Customer	NTPC	Job No.	M22/DEL-15.BHEL
Project	3X200+3X500+1x500 MW NTPC KORBA TPP-FGD	Date	12.12.2022
BHEL Doc. No.	PE-V0-466-(571-13000-A)-A210	PACKAGE	HVAC FOR FGD

TDS - Strip Heater

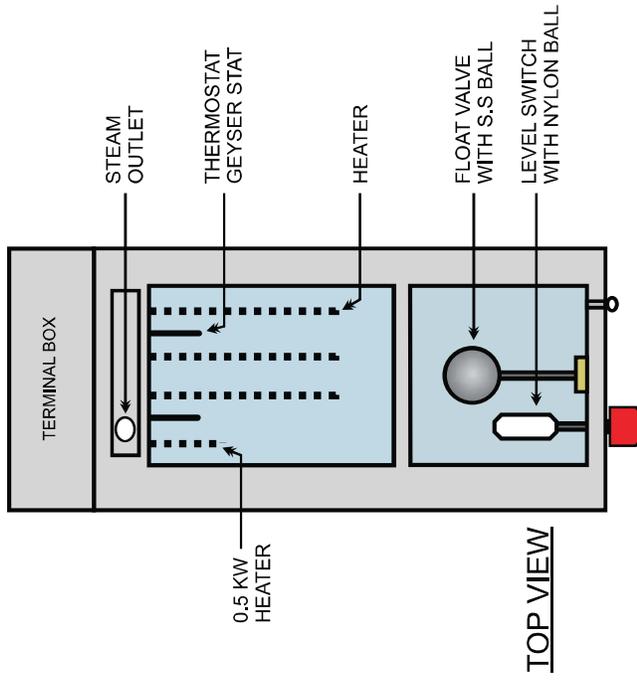
Sr. No.	DESCRIPTION	SPECIFICATION
1	Item	Electric Duct Heater
2	Manufacturer	ALCO HEATING CO.
3	Rating	6.9 KW-1 No. (3Banks of 2.3 KW) & 3.3 KW -1 No.(3 Banks of 1.1 KW)
4	Qty	1 Nos.
5	Building	FGD Control Building
6	Location	AHU Room +19.2M
7	Type	Flange-in-type (Duct Mounted)
8	Installation	Horizontal / Vertical
9	Operating Voltage	415Volts±10%/3 PH,4wire/ 50 Hz+3% &-5%, Total Freq & Voltage Var -10%
10	Terminal Box	G.I. Constructed (Dust Proof)
11	Connection	Star Connection
12	Heating Coil	Kanthal DSD Wire
13	Enclosure	G.I. Enclosure
14	Elements	Tubular air heating element U Shape SS Tubing with G.I. Fins (Tube Size-12.7mm)
15	Size of Fins	1¼" OD, 24G.
16	Cable Size	4CX10 SQ.MM
17	Duct Size	As per Duct Layout
18	Painting	Powder Coated
19	Inspection and Acceptance	Manufacturer Certificate of Conformance shall be provided
20	Testing	The following test shall be carried out 1. Resistance Check 2. Insulation Megger test 3. HV Test

Customer	NTPC	Job No.	M22/DEL-15.BHEL
Project	3X200+3X500+1x500 MW NTPC KORBA TPP-FGD	Date	12.11.2022
BHEL Doc. No.	PE-V0-466-(571-13000-A)-A210	PACKAGE	HVAC FOR FGD

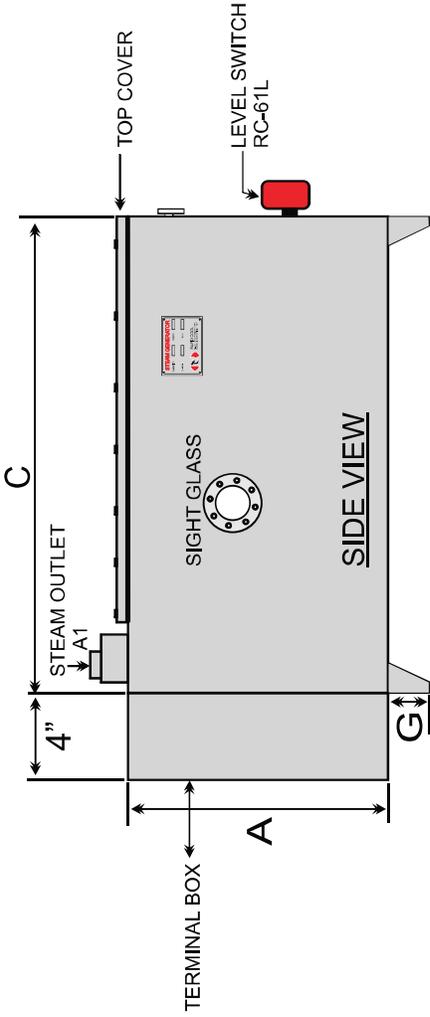
TDS - Humidifier

Sr. No.	DESCRIPTION	SPECIFICATION
1	Make	Rapid Cool
2	Item	Pan Type Humidifier (Floor Mounted) (Indoor Unit)
3	Capacity	10 KW
4	Quantity	1 nos.
5	Building	FGD Control Building
6	Location	AHU Room + 19.2M
7	Construction	1.2 mm thick Stainless Steel (SS304), In Welded construction with steam Outlet nozzle, Top Open able with S.S. Bolts.
8	Heating Element	Electrical Resistance immersion Nipple type, SS Tube Heaters.
9	Heater element Rating	3.33 KW x 3 Nos.
10	Electric Supply	415Volts±10%/3 PH,4wire/ 50 Hz+3% &-5%, Tot. Freq & Vol. Var -10%
11	Cable size	4CX10 sq.mm (Al)
12	Insulation	25mm thick Fiber Glass Wool (32 kg) and Cladded with 22 gauges GI Sheet
13	Controls	Float Valve with S.S Ball, Level Switch with Nylon Ball for Low level fault, Geyser stat (5-75 Deg C) and High Temp. Fault Thermostat (30 - 110 Deg C)
14	Capacity	0.5 KW additional Heater with Gyserstat (in built) to maintain Temperature
15	Steam Outlet	1"
16	Drain, Fill up Connection	1/2 Inches
17	Overflow Connection	Provided With Connection (3/8")
18	Level Switch/Thermostat/Sight Glass	Provided
19	Inspection & Acceptance	Manufacturer MTC will be provided

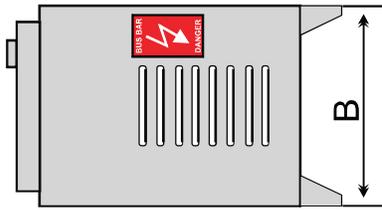
RAPID COOL MAKE PAN TYPE HUMIDIFIER



TOP VIEW



SIDE VIEW



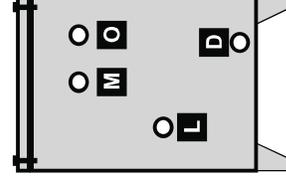
FRONT VIEW

DESCRIPTION	THICKNESS	MATERIAL
CONSTRUCTION	1.2mm	STAINLESS STEEL-304 L GRADE SHEET
INSULATION	25mm	RESIN BONDED FIBER GLASS WOOL
CLADDING	22 Gauge	GALVANIZE IRON SHEET

HEATER TYPE	ELECTRICAL RESISTANCE IMMERSION (NIPPLE TYPE) S.S TUBE HEATER		
	LEVEL SWITCH WITH NYLON BALL		
	FLOAT VALVE WITH S.S BALL		
CONTROLS	SIGHT GLASS		
	OVERFLOW VALVE		
	GEYSER STAT (5 TO 75 DEGC)		
	THERMOSTAT (30 TO 110 DEGC)		

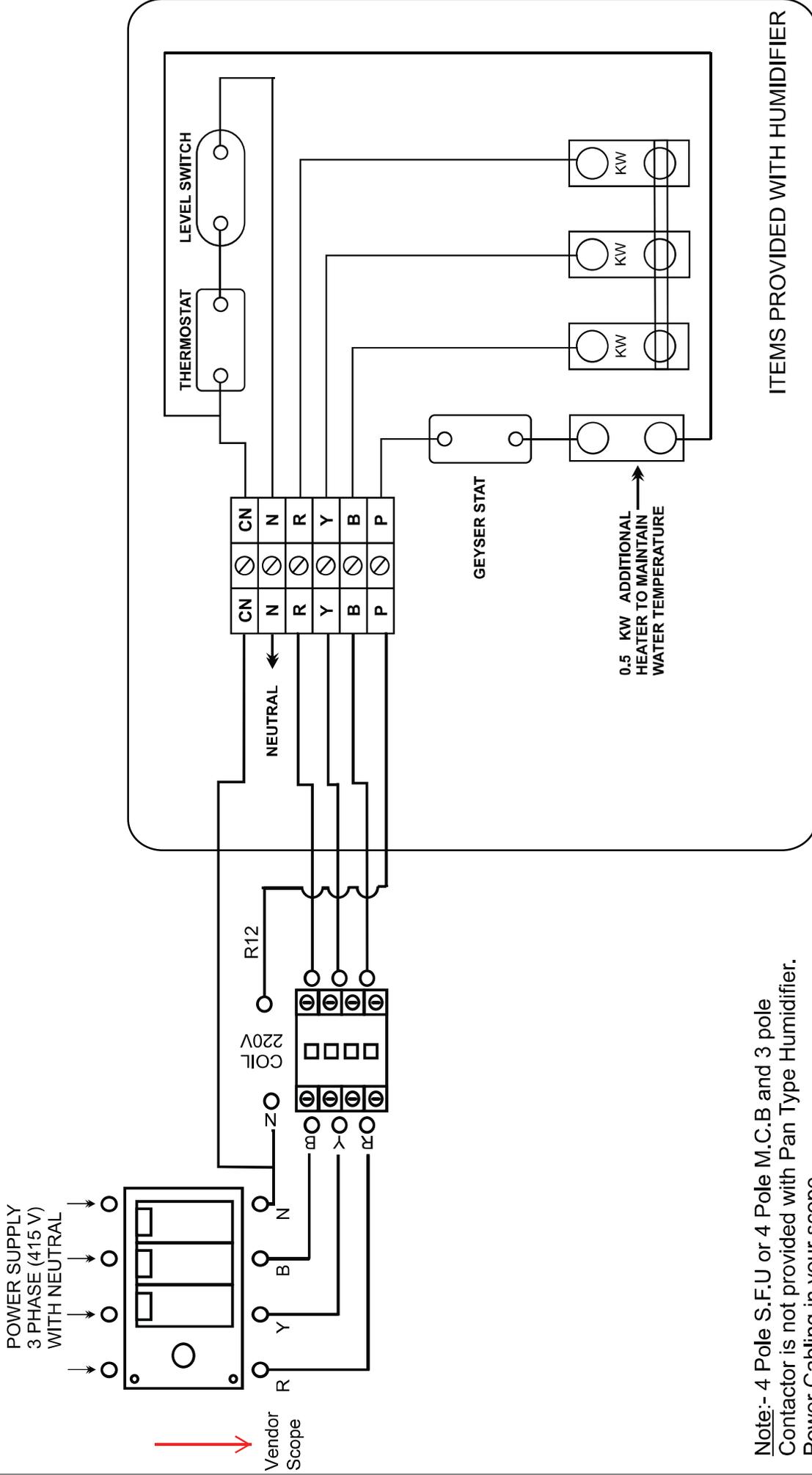
CAPACITY	TYPE	RATING	A	B	C	G	A1
10 KW	FLOOR	3.33KW x 3	15	12	24	3	1
MEASUREMENT ARE IN INCHES							

BACK VIEW



O	OVERFLOW SOCKET 3/8"
M	WATER INLET SOCKET 1/2"
D	DRAIN SOCKET 1/2"
L	LEVEL SWITCH SOCKET 1/2"

WIRING DIAGRAM FOR PAN TYPE HUMIDIFIER WITH HUMIDISTAT



Note:- 4 Pole S.F.U or 4 Pole M.C.B and 3 pole Contactor is not provided with Pan Type Humidifier. Power Cabling in your scope.

32 AMP. - S.F.U or M.C.B - 1 NO.

AC1 DUTY - 25 AMP. CONTACTOR - 1 NO.

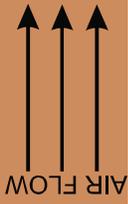
POWER CABLING - 4CX10 SQ.MM

(MAKE IN INDIA)
DRAWING NO - 0436-P/TH
DATE - 05-MAY-2020
MADE BY - J.P. Singh

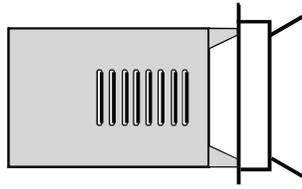
CLIENT / CONTRACTOR
Advance Ventilation Pvt Ltd.
MANUFACTURER
RAPID COOL
CHECKED BY - N.S RIYAT

JOB
2 X 250.MW/NSPCL BHILAI/TPP-FGD

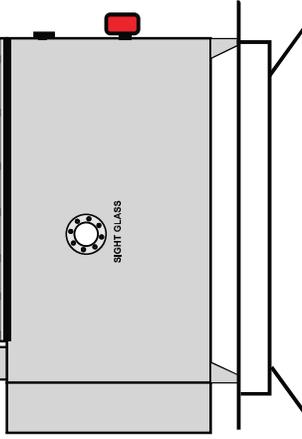
A.H.U SUPPLY DUCT



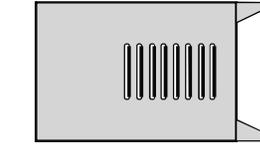
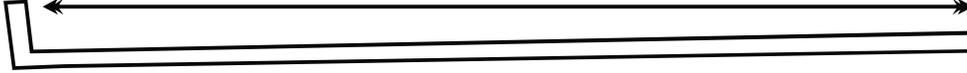
TILT PIPE TOWARDS HUMIDIFIER
SO THAT CONDENSE WATER MAY
DRIP DOWN TO THE HUMIDIFIER TANK.



YOU CAN PLACE HUMIDIFIER ON STOOL TO INCREASE HEIGHT



MAX HEIGHT - 3 METER
VERTICAL

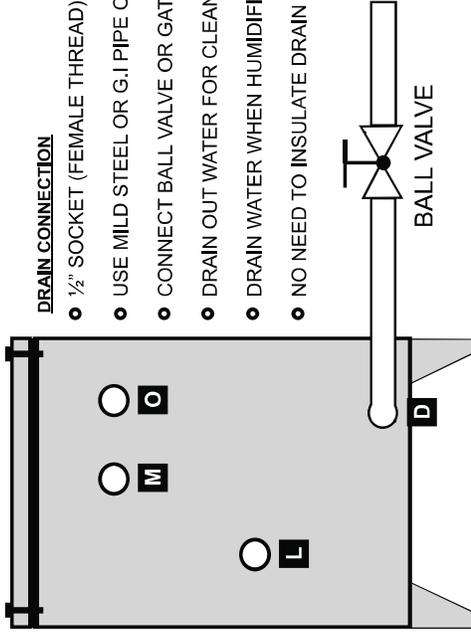


YOU CAN PLACE HUMIDIFIER ON FLOOR



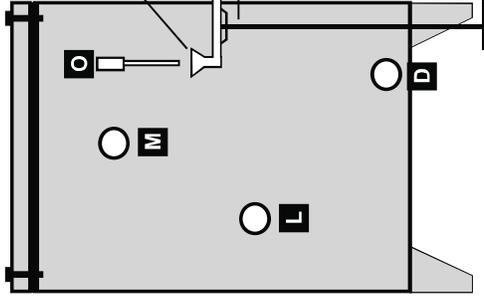
DRAIN CONNECTION

- 1/2" SOCKET (FEMALE THREAD)
- USE MILD STEEL OR G.I PIPE OF 1/2".
- CONNECT BALL VALVE OR GATE VALVE.
- DRAIN OUT WATER FOR CLEANING OF TANK AND HEATER.
- DRAIN WATER WHEN HUMIDIFIER IS NOT IN USE.
- NO NEED TO INSULATE DRAIN PIPE.



OVERFLOW CONNECTION

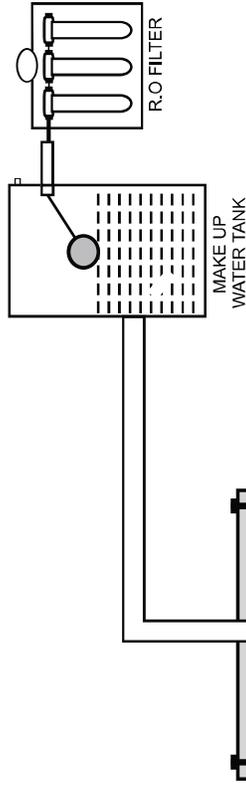
- FUNNEL OF G.I SHEET
- FLEXIBLE RUBBER PIPE
- STAND FOR SUPPORT (IF NECESSARY)



- 3/8" SOCKET (FEMALE THREAD)
- NYLON OVERFLOW VALVE PROVIDED WITH THE UNIT.
- CONNECT FUNNEL WITH PIPE WITH LENGTH TO THE NEAREST DRAIN POINT.
- THE WATER WILL OVERFLOW ON FAILURE OF FLOAT VALVE
- FUNNEL TO PLACED BELOW THE OVERFLOW PIPE.

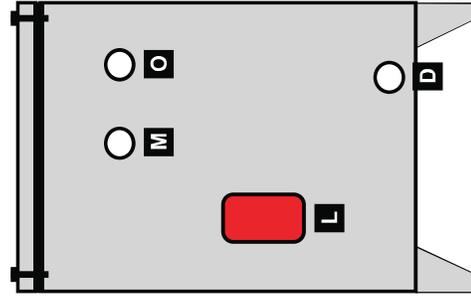
MAIN WATER INLET CONNECTION

- 1/2" SOCKET (FEMALE THREAD)
- USE MILD STEEL OR G.I PIPE OF 1/2".
- CONTINUOUS WATER SUPPLY IS REQUIRED.
- CONNECT MAKE UP WATER TANK OF MINIMUM 75 LITER.
- KEEP MAKE UP WATER TANK AT HEIGHT OF 10 FEET.
- NO NEED TO INSULATE WATER INLET PIPE.
- NO PUMP OR PRESSURIZED WATER REQUIRED.
- FLOAT VALVE PROVIDED AT MAIN INLET.
- USE R.O WATER WITH WATER HARDNESS BELOW 30 PPM.



LEVEL SWITCH CONNECTION

- 1/2" SOCKET (FEMALE THREAD)
- LEVEL SWITCH PROVIDED WITH THE UNIT.
- PRE WIRED.



PROJECT	: 3X200+4X500 MW NTPC KORBA TPP- FGD
OWNER	: M/s NTPC LIMITED
CONTRACTOR	: M/s. BHARAT HEAVY ELECTRICAL LTD.
SUB CONTRACTOR :	
TECHNICAL DATA SHEET	
Item	Air Handling Unit
Make	
Material & Relevant Standard	
Location	
Airflow Capacity (CFM) / TR	22000 / 50 TR (Actual)
Airflow Capacity (CMH) / TR	37400 / 50 TR (Actual)
Static Pressure (MM WG)	65
Type	Floor Mounted (Horizontal)
Quantity (Nos.)	6
General	
Types of Units	Double Skin Air Handling Unit
Material of Casing	
Outer	24G (0.63 mm thick) Pre coated Sheet (120 GSM) As Per IS 277 Standard
Inner	24G (0.63mm thick) Pain GI Sheet (120 GSM) As Per IS 277 Standard
Panel Thickness	25 mm
Frame Work	Extruded Aluminium Profile
Insulation of Panel	PUF Injection CFC Free (Density 40 Kgs / Cub Mtr & Fire Retardant)
Drain Pan Insulation	PUF Injection (25-40) mm
Drain Pan	18G SS-304 Sheet Drain Pan With PUF injection and covered With Plain GI Sheet
Unit Base & Vibration Isolation for AHU	GI Galvanized & Neoprene Rubber Cushy Foot
Hardware	Galvanized
Width (mm)	2775
Height (mm)	2150
Depth (mm)	245
Centrifugal Blower	
Manufacturer	
Blower Diameter (mm)	
Type of Blower	DIDW Backward Curved Centrifugal
Quantity of Fan Per AHU (Nos.)	One (1)
Arrangement (as per AMCA)	CCW-360
Fan Speed (RPM)	979
Critical Speed (RPM)	1600
GD2 Value (kgfm ²)	43.6
Fan BkW @20°C, at Rated Duty Point	9.51
Motor rating 115% (kW) at 50°C Duty Point	20.0 H.P. / 15.0 KW (415V ± 10%, 50 Hz), (4 POLE)
Fan Outlet Velocity (m/s)	10.24
Fan Total Efficiency (%)	78%
Fan Static Efficiency (%)	71%
Type of Balancing	Both Statically & Dynamically Balanced As per ISO-1940, Gr 6.3
Noise Level @1.0 meter Distance from AHU Casing at 1.5m Elevation	≤85 dB (A)
Vibration Level (RMS)	Vibration <6.3mm/Sec
Material of Cnstruction for the Centrifugal Blower	
Fan Base Material	Extruded Aluminium Profile
Fan Casing	Minium 3 mm Thick MS spray Galvanized (minimum 60 Micron DFT)
Scroll	Minium 3 mm MS Spray Galvanized (minimum 60 Micron DFT)
Impeller Material	MS Epoxy Coated
Shaft Material/ Diameter (mm)	SAE-1045/ 60mm
Bearing No./ Make	UKP-213 /FAG
Bearing (Type)	Self Aligning Pillow Ball Bearing Permanently lubricated Heavy duty with design life of 40,000 Operating Hours
Impeller Dia (mm)	HRZ-B 07-800
Type of Fan Drive	V-Belt Driven with removable belt guard
Fan Pulley	225 mm X 3SPB
Motor Pulley	172 mm X 3SPB
AHU V Belt Design	Designed 150% of Rated Power
V Belts provided/ Qty per fan	3 Nos

Vibration Isolator Make	Resistoflex
Vibration Isolator Efficiency	Min. 85%
Model no of Vibration Isolator	OS-25/160
Vibration Isolator QTY per AHU	9 Nos
Inspection & Testing	As per approved QAP
Motor	
Manufacturer	HEM
Motor Type	TEFC Squirrel Cage Induction
Electrical Characteristics	415V ± 10%, 50 Hz
Motor Rating Selected, kW	20.0 H.P. / 15.0 KW
Motor Pole	4 Pole
Motor RPM	1440
Quantity per AHU (Nos.)	One (1)
Class of Insulation	Class 'F' Subject to Temperature Rise of Class-B
Energy Efficient class	IE-3
Motor Protection	IP-55
VFD Compatible	No
Cooling Coil	
Manufacturer	Waves Aircon Pvt Ltd
Coil Type	DX Type
Cooling Coil Capacity as per BOQ, TR	55.9 TR
Cooling Coil Capacity achieved by Coil, TR	154.05 TR
Sensible Capacity, TR	114.91 TR
Latent Capacity, TR	39.14 TR
SHR Coil	0.74
Coil Tube (MOC/ OD/ Thickness)	Seamless Copper Tube/ 1/2" / 0.4 mm Thick
Coil Fin (MOC / Thickness / No of Fins)	Aluminum 37G / 11 to 13 FPI
Coil Header	Copper Header With Brass Distributor
Coil Frame	Galvanized
No. of rows	4RD
Coil Size (mm) x Nos.	952.5 FH X 2200 FW X 2 NOS
Max. Coil face Velocity	≤2.5 m/sec.
Coil Test pressure	550 Psi
Pre- Filters (EU-4)	
Manufacture	As per Approved make
Filter Type	Cassette Type
Filter Frame	18G as per IS 277
Filter Media	Synthetic Non Woven (Fire Retardant & Resistant to Moisture, Fungi, Bacteria & Frost) Progress density Filter Media Having High Dust Holding Capacity at lesser pressure drop with HDPE Mesh on Air entry Side & All Expanded mesh on Air
Pressure Drop Across Filter (IPD)	<5 @ Rated Flow
Pressure Drop Across Filter (FPD)	Up to 7.5 mm wg
Max. Filter Area Velocity	≤ 2.5m/sec
Average Synthetic Dust Wt. Arrestance	65-80%
Filter thickness	50mm
Inspection	As Per Approved QAP
Testing Standard	BS: 6540/ASHRAE52-76/EN779
Accessories	
Canvass Connection	Provided between Fan & Casing Inside AHU
SS Drain Socket	Provided
Weather Proof Light	Provided
Limit Switch for Door	Provided
Door View Window	Provided

Neoprene Rubber Cushy Foot with Vibration Isolation efficiency of Min. 85% for AHU provided.

S.NO	DESCRIPTION	MATERIAL	QTY
1	AIRU CAPACITY	22000 CFM (37400 CMH)	6
2	STATIC PRESSURE	65 MM WG	-
3	BLOWER	800 MM DIA. (8C) MAKE : 'AVPL'	1
4	MOTOR (W/O)	200 H.P. (145V ± 10%, 50 HZ), (4 POLE)	-
5	COOLING COIL (DX-TYPE)	952.5 FH X 2200 FL X 8RD.1/2"O.D. X 0.4 MM THK.	2
(D)	COIL HEADER	COPPER HEADER WITH BRASS DISTRIBUTOR	-
(H)	COIL FRAME	GALVANIZED	-
(H)	COIL - FINS	ALUMINIUM / 37G / 11-13 FPI	-
6	PRE FILTER	610 X 610 X 50 X 12 NOS.	-
7	CANVASS CONNECTION	FIRE RETARDANT CANVASS CLOTH	-
8	VIBRATION ISOLATORS	SPRING MOUNTED	6
9	INSPECTION DOOR	DOUBLE SKIN	1
10	FAN & MOTOR BASE	EXTRUDED ALUMINIUM PROFILE	-
11	DRAIN TRAY	18G SS-304 DULY PUF INJECTED & COVERED WITH PLAIN GI SHEET	-
12	UNIT BASE	GI CHANNEL BASE FRAME	-
13	FAN PULLEY (C.I.)	254 MM X 38PB	1
14	MOTOR PULLEY (C.I.)	172 MM X 38PB	1
15	FAN RPM	979	-
16	FAN OUTLET VELOCITY	10.24 m/sec	-
17	OUTER SHEET	0.63 MM THK. PRE COATED GI SHEET	-
18	INNER SHEET	0.63 MM THK. PLAIN GI SHEET	-
19	PANEL INSULATION	25 MM	-
20	PANEL INSULATION	PUF INJECTED / (CFC / HFC FREE & FIRE RETARDANT)	-
21	BY PASS DAMPER	110 (W) X 1905 (FH)	-
22	NO OF DISTRIBUTOR	TO BE CONFIRMED BY CLIENT	-

OPERATING WEIGHT (APPROX. KG) - 1320 KG
 DYNAMIC WEIGHT (APPROX. KG) - 1980 KG

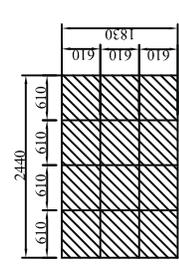
FH COOLING FIN HEIGHT
 FL COOLING FIN LENGTH

PLEASE CONFIRM FACING FILTERS
 MOTOR CONNECTION: RHS LHS
 FAN DISCHARGE:

COIL CONNECTION: RHS LHS
 UNIT DISPATCH CONDITIONS
 DRAIN CONNECTION: RHS LHS
 ASSEMBLED DISMANTAL C.K.D

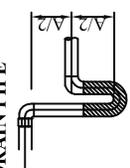
DRG. TITLE
DOUBLE SKIN FLOOR MOUNTED AIR HANDLING UNIT

PROJECT NAME:- M/s. 3X200+4X500 MW NTPC KORBA TPP-PGD
 CLIENT/CONSULTANT :- NTPC
 EPC CONTRACTOR:- M/s. BIHARAT HEAVY ELECTRICAL LIMITED
 SUB CONTRACTOR:-
 DRAWN BY: DHIRAJ SCALE N.T.S. DRG. NO. 22-1542-AA-01-20060-2379
 CHECKED BY: A.B. DATE: 28.02.23 REVISION NO. 1

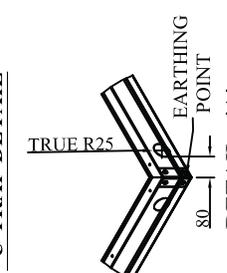


SECTION FILTER GRID DETAILS FOR PRE FILTER

DRAIN PIPE



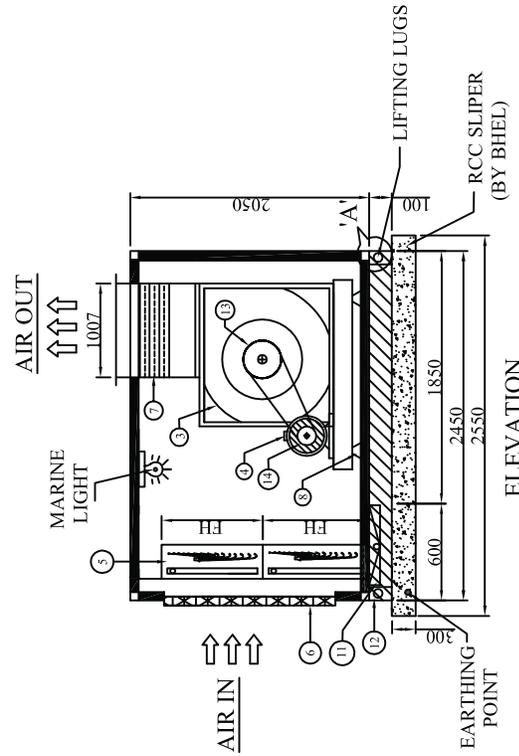
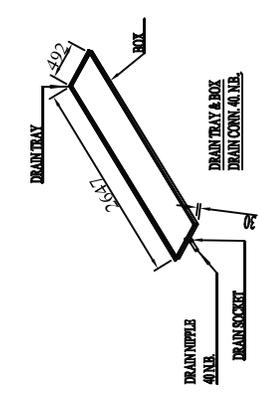
A- FAN TOTAL STATIC PRESSURE U TRAP DETAIL



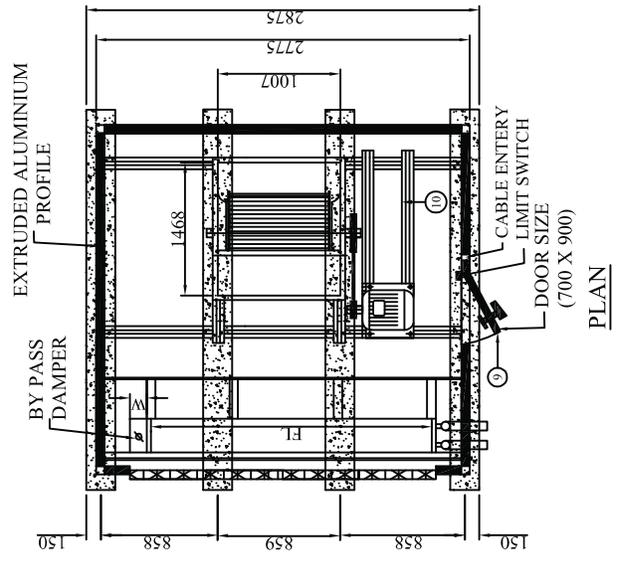
DETAIL - 'A' FOR LIFTING LUGS



TOP ELEVATION



ELEVATION



PLAN

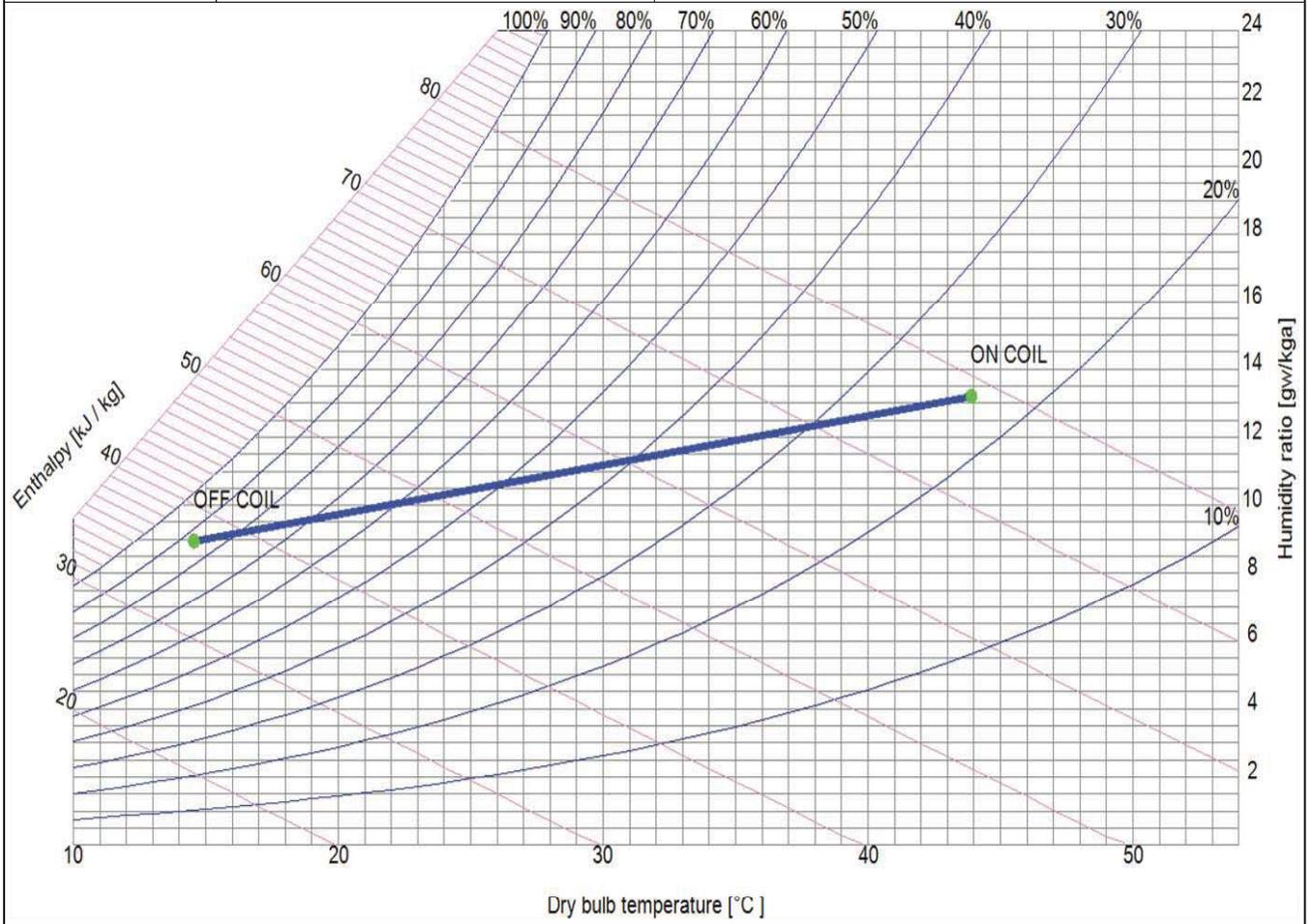
Offer Code :
 Customer : ADVANCE
 Project : 3X200+4X500 MW NTPC

Date
 02/ 03 / 2023

COIL SECTION - DIRECT EXPANSION COIL

CW 32x28 / 60 / 08 / 2.3 / 2200 Al/Ga (120)

Capacity						Dimensional data			
Total		542.45 kW				Height	1905.00 mm	Length	2200.00 mm
Latent		137.83 kW				Depth	220.00 mm	Exch. Surface	719.41 m ²
Sensible		404.62 kW				Rows Nr.	8 N°	Tubes Nr. For Row	60 N°
AIR SIDE						Circuits Nr.	120 N°	Tubes Pitch	31.75 mm
	Temp.	Rel. Humid.	Air flow	Air Vel.	Press. Drops Dry/Wet	Weight	21 kg	Rows Spacing	27.50 mm
	°C	%	cft/min	m/s	Pa	N° Coils	2	Fin Spacing	2.30 mm
Inlet	43.90	23	22000	2.48	140/174	Tube	Copper	Fin	Aluminium
Outlet	14.55	88				Material	Copper	Material	Aluminium
Density		Normal				Ext. Diameter	12.70 mm	Thickness	0.13 mm
Q.ty Produced Water		102.54 kg/h				Thickness	0.4 mm	Fin corrugation type	Smooth
FLUID SIDE						Manifolds			
Evap. Temp.	7.00 °C	Fluid Flow		7258.4 kg/h		Inlet Manifolds	-	Thickness	- mm
Cond. Temp.	58.00 °C	Fluid. Vel. Gas/Liquid		11.12 / 0.23 m/s		Outlet Manifolds	2 x 42x1,5	Thickness	1.50 mm
Overheating	6.0 K					Manifolds material	Copper		
Subcooling	4.0 K	Press. Drops		45.67 kPa					
Fluid	R407C								



Coil is NOT certified by AHRI

Project Name: KORBA
 Project no:

Client Name: NTPC

Item ref: 1

Specified duty: Date: 01-03-2023

Air Volume: 22000 cfm

Static pressure: 65

Description: HRZ-B 07 800

Fan speed: 979 1/min

Fan Type: DIDW Backward Curve Centrifugal

Air volume: 37400 m³/h

Total pressure: 715 Pa

Efficiency: 78 %

Static pressure: 652.1 Pa

Sound power: 91 dB(A)

Motor power: 15.00 kW

Voltage: 380-415 V

Absorbed power: 9.51 kW

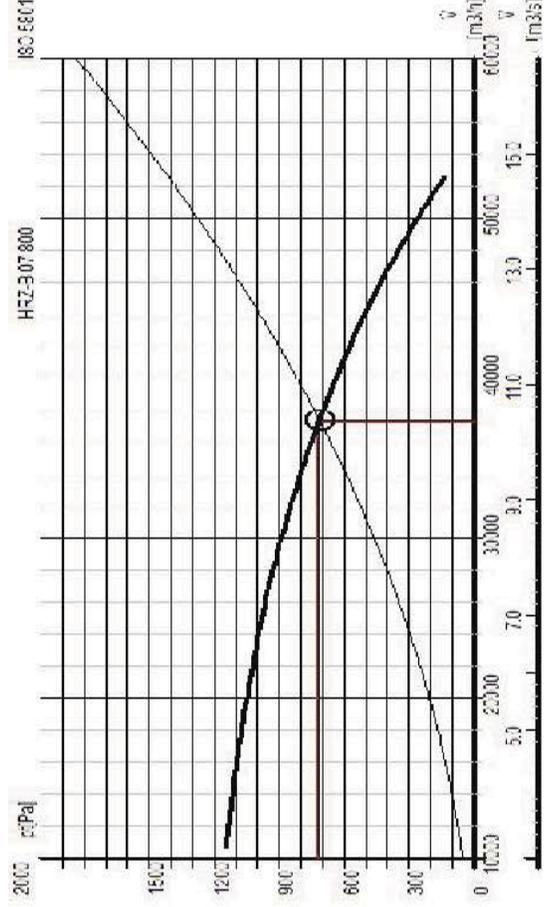
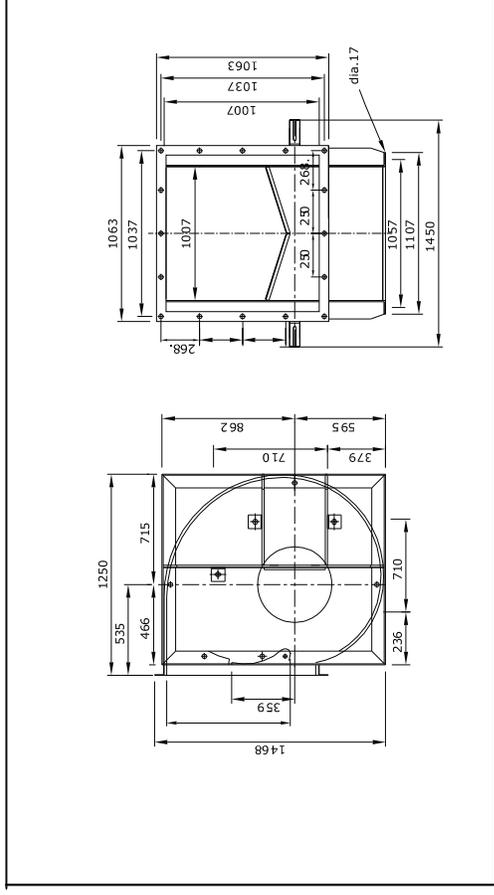
Frequency: 50 Hz

Outlet Velocity: 10.24 m/s

Sound Pressure(1m): 80 dB(A)

Sound Pressure(1.5m): 76 dB(A)

Sound Pressure(3m): 70 dB(A)



AVPL-HRZ-B 07 800

***TDS & GA of
Fresh Air Fan***

TDS & GA Drawing of Supply Air Fans

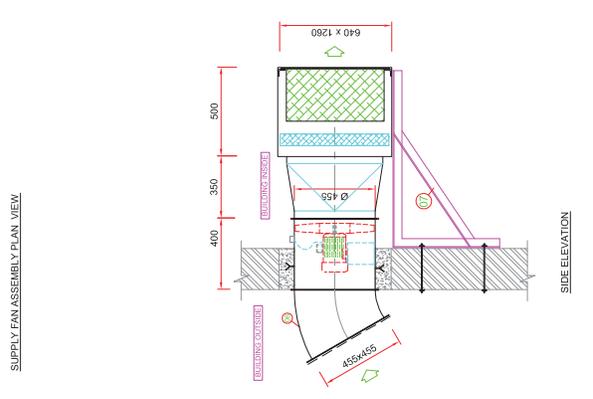
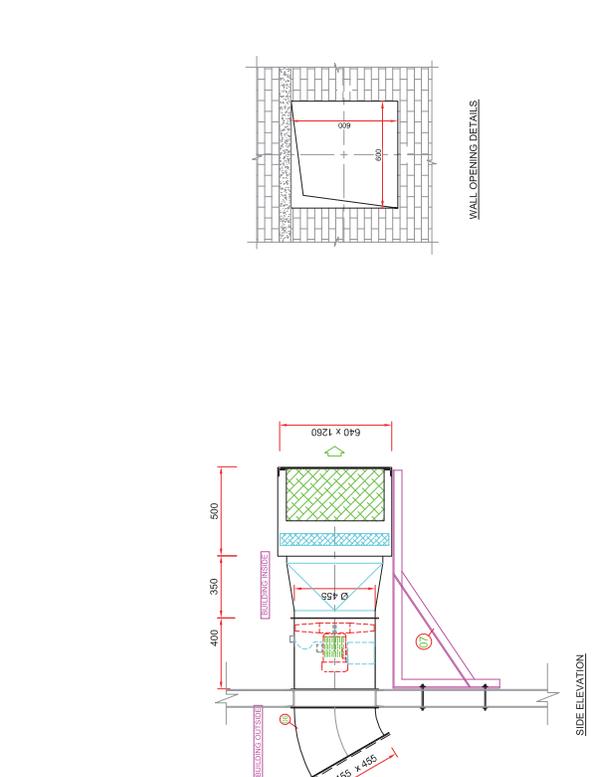
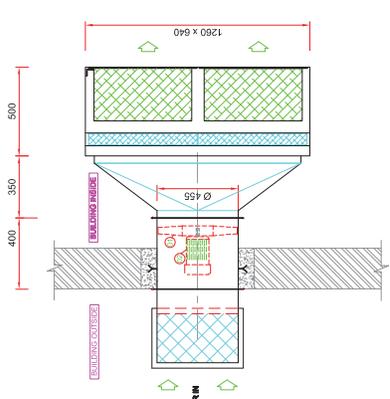
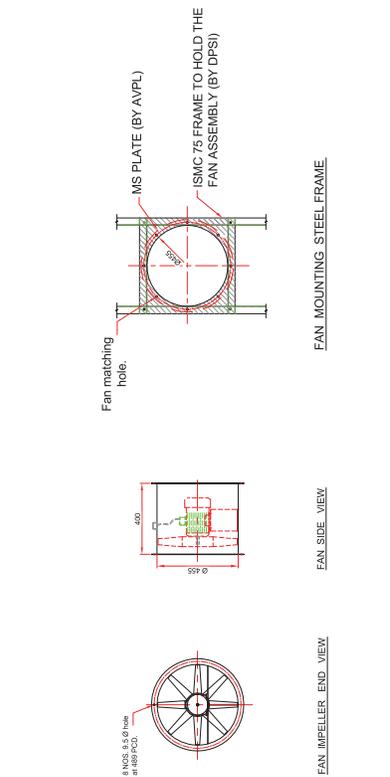
Sr. No.	Description	Unit	Particulars
1	Manufacturer		
2	Model No.		AdTV-450
3	Type of Fan		Supply Air Fan Fans
4	Capacity	CMH	Provided - 6000, Reqd. 5610
5	Quantity		2 Nos., As per HLC for AC System
6	Static pressure	mmWG	30
7	Total pressure	mmWG	44
8	Impeller Diameter	mm	450
9	No. of blade	Nos.	8
10	Blade angle	Degree	20
11	Fan/Impeller Speed	RPM	2870
12	Critical Speed	RPM	3587
13	Shaft Power	BkW	1.22
14	Fan Static Efficiency at Duty Point	%	41
15	Fan Total Efficiency at Duty Point	%	60
16	Bearing Type	BALL BEARING	
17	Selection curves enclosed (yes/No)	yes	yes
18	Fan Dynamic Load	Kg	
19	Motor Data		
	a) Rating	kW/Pole	1.1/2
	b) Speed	RPM	2870

TECHNICAL DATA SHEETS & GA DRAWING FOR AXIAL FANS ALONG WITH FIXING DETAILS

	c) Type of Mounting	B3	
	d) Direction of Rotation	CLOCKWISE/ANTICLOCKWISE	
	e) Motor Bearing No.	DE:6204.ZZ NDE:6203.ZZ	
20	Material		
	a) Impeller	CAST ALUMINIUM BADE OF AERO -FOIL DESIGN	
	b) Casing	MS	
	c) Casing thickness (mm)	3	
	d) Shaft	MOTOR SHAFT (EN-8)	
21	Accessories	RAIN PROTECTION COWL, BIRDMESH	
22	Pre Filter	PRE FILTER	
	a) Filter size	610x610x50	
	b) No. of filters	2	
	d) Filter type	610x610x305	
	e) Filter size	2	
	f) No. of filters		
23	Painting	AS PER SPECIFICATION	
24	Noise Level	DB(A)	≤ 85 DB(A)
25	Balancing Grade	AS PER ISO 1940-6.3	
26	Vibration Level	AS PER ISO 14694	
27	Inspection & Testing	AS PER APPROVED QAP	

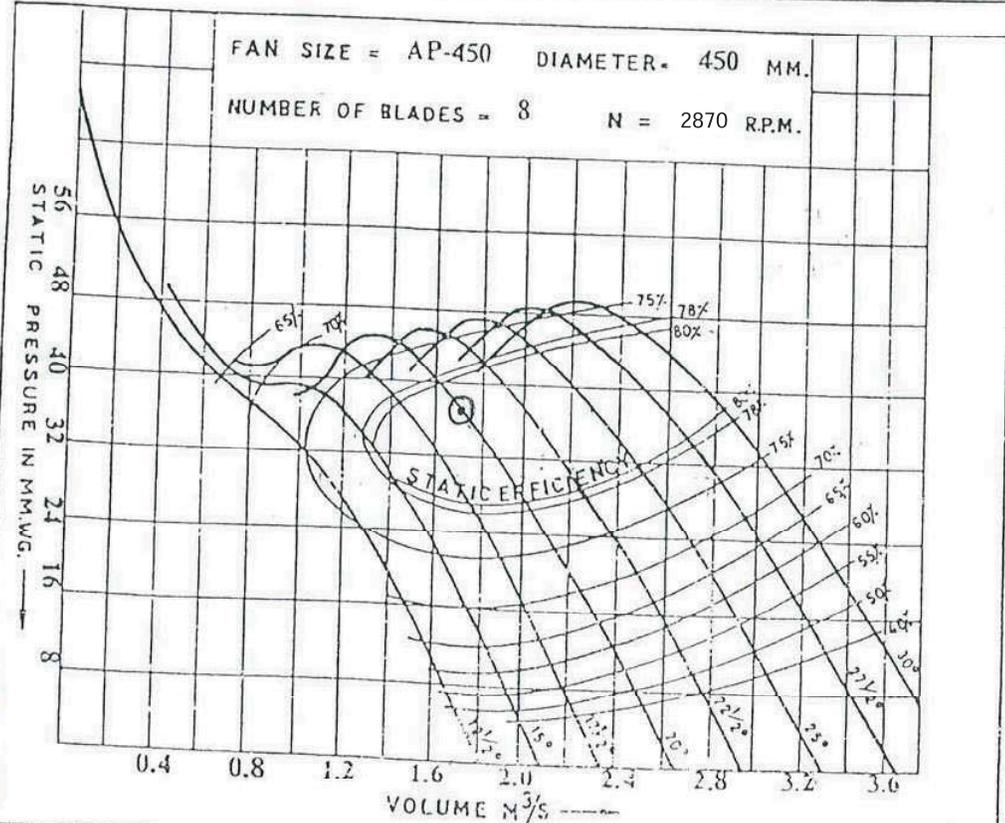
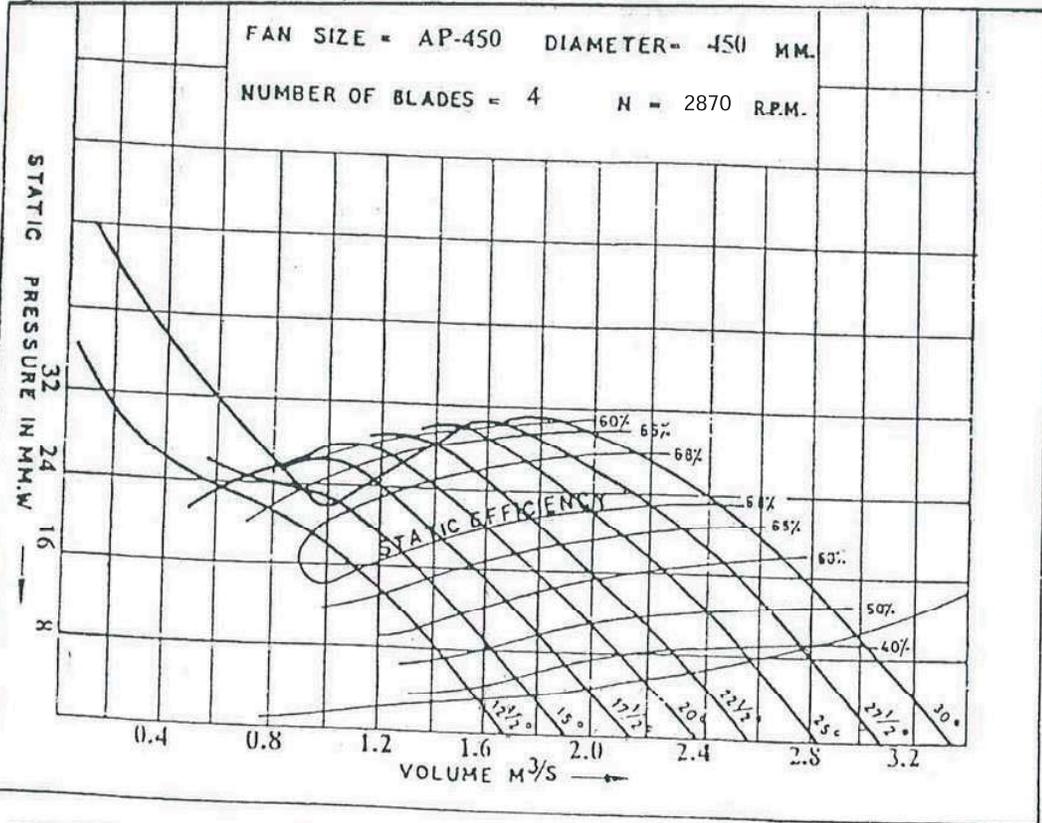
Fan Flow Rate shall be adjusted at site as per heat load calculation during commissioning through Volume Control Damper provided at Fan discharge

1	2	3	4	5	6																																
<p>NOTES:-</p> <ol style="list-style-type: none"> ALL DIMENSIONS ARE IN MM. SUPPLY AIR FAN ENCLOSURE SUPPORTED ON THE ANGLE FRAME AND SAME IS BOLTED WITH FAN ENCLOSURE. ITEM LISTED IN BOQ IS FOR SINGLE FAN ONLY. FAN WILL BE INSTALLED AS PER APPROVED VENTILATION CALCULATION IN VARIOUS BUILDINGS. KKS TAG FOR THE FANS WILL BE INCLUDED IN CONCERN VENTILATION EQUIPMENT LAYOUT OF CONCERN BUILDING. QUANTITY OF FAN AS PER APPROVED LAYOUT. FAN MOUNTING SLEEVE, GROUTING SHALL BE DONE BY 																																					
<p>LEGEND/SYMBOL:-</p> <table border="1"> <tr> <th>SYMBOL</th> <th>DESCRIPTION</th> </tr> <tr> <td></td> <td>PRE FILTER</td> </tr> <tr> <td></td> <td>FINE FILTER</td> </tr> <tr> <td></td> <td>FAN</td> </tr> </table>						SYMBOL	DESCRIPTION		PRE FILTER		FINE FILTER		FAN																								
SYMBOL	DESCRIPTION																																				
	PRE FILTER																																				
	FINE FILTER																																				
	FAN																																				
<p>FOR APPROVAL</p>																																					
<p>Owner's Engineer NTPC LIMITED A GOVERNMENT OF INDIA ENTERPRISE BHARAT HEAVY ELECTRICAL LTD SECTOR-45&A, POET NO.25, NERUDA, 202304</p>																																					
<p>Project 3X200-3X500-1X500 MW NTPC KORBA</p> <table border="1"> <tr> <td>Date</td> <td>10.03.24</td> <td>Issue</td> <td>TECHNICAL DATA SHEETS</td> </tr> <tr> <td>Checked</td> <td>10.03.24</td> <td>By</td> <td>& GA DRAWING FOR AXL</td> </tr> <tr> <td>Approved</td> <td>10.03.24</td> <td>By</td> <td>GA DRAWING WITH FINISH</td> </tr> <tr> <td>Drawn by</td> <td>AC/00000000</td> <td>Details</td> <td>DETAILS</td> </tr> <tr> <td>Scale</td> <td></td> <td>Sheet No.</td> <td></td> </tr> <tr> <td>Contract</td> <td>HVAC</td> <td>Rev.</td> <td></td> </tr> <tr> <td>Project No.</td> <td>PE-VO-466-(571-13000-A)A202</td> <td>Page No.</td> <td></td> </tr> <tr> <td>Sheet No.</td> <td></td> <td>Sheet Total</td> <td>44 (Maximum)</td> </tr> </table>						Date	10.03.24	Issue	TECHNICAL DATA SHEETS	Checked	10.03.24	By	& GA DRAWING FOR AXL	Approved	10.03.24	By	GA DRAWING WITH FINISH	Drawn by	AC/00000000	Details	DETAILS	Scale		Sheet No.		Contract	HVAC	Rev.		Project No.	PE-VO-466-(571-13000-A)A202	Page No.		Sheet No.		Sheet Total	44 (Maximum)
Date	10.03.24	Issue	TECHNICAL DATA SHEETS																																		
Checked	10.03.24	By	& GA DRAWING FOR AXL																																		
Approved	10.03.24	By	GA DRAWING WITH FINISH																																		
Drawn by	AC/00000000	Details	DETAILS																																		
Scale		Sheet No.																																			
Contract	HVAC	Rev.																																			
Project No.	PE-VO-466-(571-13000-A)A202	Page No.																																			
Sheet No.		Sheet Total	44 (Maximum)																																		



07.	FRESH AIR UNIT SUPPORT	02 nos.	ISA - 40x5	
06.	AIR DISCHARGE COWL WITH BIRD MESH-455x455x30'	01 no.	G.I	
05.	FILTER BOX - 1260x640x500	01 no.	G.I	
04.	AIR FINE FILTER - 610x610x305	02 nos.	HDPE MESH	
03.	AIR PRE FILTER -610x610x50	02 nos.	HDPE MESH	
02.	MOTOR 1.1Kw/2POLE	01 no.	-	
01.	SUPPLY AIR FAN AdTV-450/8B	01 no.	MS	
PART NO.	DESCRIPTION	QTY.	MATERIAL	MAKE
	Dynamic Load Fan with unit (Kg)	150		
	Fan Model	AdTV-450/8B		
	Fan Speed (RPM)	2870		
	Qty. (Nos.)	1		
	Motor Kw/Pole	1.1/2P		
	S.P. (mmWC)	30		
	Air Capacity (CMH)	6000		

Fan characteristics curves





TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

SECTION-C1
TECHNICAL SPECIFICATION
(OPERATION AND MAINTENANCE SERVICES FOR AIR CONDITIONING SYSTEM)



TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

1.0 OPERATION AND MAINTENANCE SERVICES

The bidder scope also covers the Operation and Maintenance (O&M) services for Preventive and Breakdown maintenance from the date of successful commissioning till handing over to end customer. However, actual date of start of O&M services shall be communicated to successful bidder by BHEL site personnel.

Bidder to note that the spares and consumables required for maintenance of the equipment during this O&M period shall be in bidder's scope of supply. Bidder shall use only genuine parts as mentioned in O&M Manual. Any damage or malfunction caused by the use of unauthentic parts or unqualified personnel shall be responsibility of bidder and as a consequence of above bidder is required to replenish the unauthorized part and abridge the qualified person without any commercial implication to BHEL.

O&M Services scope also covers all regular maintenance by trained service engineers and supply of genuine parts and lubricants as per the original equipment manufacturer's recommendations.

For the purpose of Operation of Air Conditioning System, One-day shall be considered as 24 hours i.e. 3 shifts of 8 hours each. The AC System (along with related accessories) shall be operated on Round-the-clock basis on all the days of the year including Sundays and Public Holidays

O & M Personnel should be acquainted with local language. Governmental / Statutory approval w.r.t. O&M service as applicable shall be in bidder's scope.

Total duration of the Operation and Maintenance services has been envisaged as per price format for individual AC System / buildings identified in price format/specification. The duration of operation & maintenance services can be increased or decreased as per requirement and payment in such case shall be made on pro-rata basis.

The operation and maintenance services can be continuous or intermittent as per site requirement for individual AC System / buildings identified in price format/specification.

Bidder has to compulsorily maintain log book for the O & M staff engaged for O&M jobs and submit to Engineer-in charge for certification for realization of the bills. After certification of the bill by Engineer in charge of BHEL, bidder shall claim the amount after completion of minimum 30 days.

Depending on start of O&M services, there is a possibility that some period of O & M services and Warranty period may overlap. However, it is clarified that any maintenance required or any spare of AC System required to be replaced during Warranty period (as part of warranty clause requirement) shall not be made part of O&M Services. Bidder may take care of this fact while working out the prices of O & M services



TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

Wherever AC system has been written in O&M Service Specification, the same shall be deemed as complete AC System.

The vendor shall deploy following minimum manpower for Operation of AC System.

- i. Two qualified and experienced operator per shift on "Round the Clock" basis throughout the year for all days of the year including Sundays & Public Holidays. There must be minimum 30 minutes overlapping between two shift operators to get familiarize with the status of AC System.
- ii. One Helper per shift on " Round the Clock" basis throughout the year for all the days of the year including Sundays and Public Holidays. The helper shall assist the Ventilation System Operator in day to day operation of AC System and accessories and shall assist him for keeping AC System equipment's in neat and tidy condition.

1.1 Responsibility of System Operator

- i. AC System operator shall be responsible for proper sequential operation of AC System in a predefined sequence and stopping the same (when necessary) as per the procedural practice. In case of any abnormality (like non-availability of power supply at in-comer of Ventilation System), he shall immediately report the matter to BHEL site Engineer for further action. Similarly, any malfunctioning in the system shall be immediately reported by him to BHEL site Engineer for suitable corrective action irrespective of time of occurrence of malfunctioning / abnormality in the system. A log book of all such outages shall be maintained by AC system operator, which shall be shared with BHEL site engineer on periodic basis.
- ii. AC System operator shall take hourly readings of all the parameters of AC System / Equipment's including reading on main electrical panel of AC System.

1.2 Responsibility of Helper.

- i. The AC System helper shall assist AC System operator for day to day smooth operation of AC System, like Checking of water levels of cooling tower, cleaning of Tanks, cleaning of strainers, checking water parameters of softening plant cleaning of AHU filters and other filters etc. as and when required. He shall be responsible for keeping all the equipment's of AC System as applicable in clean and tidy condition. He shall also carry out general cleaning of all AC equipment including Electrical Panels (Part of AC System), etc. on regular basis.
- ii. The helper shall work under the control of AC System operator and shall always ensure that unusable junk materials are not allowed to be kept in AC plant room or ahu room.



TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

iii. Under such eventuality, he will report the matter to Plant Operator, who in turn will take suitable action including reporting the matter to BHEL site Engineer.

1.2.1 All the log book registers shall be arranged by vendor. Log book register duly paged and bounded will be maintained in good condition by vendor.

1.2.2 All the necessary tools & tackles and other materials, required for operation of AC System shall be kept by vendor under the control of AC System operator. These tools & tackles shall be separate from tools & tackles (as per price format) which shall be handed over to customer in new condition. Required testing instruments like refrigerant leak detector, Multi Meter (for Electrical portion of AC System), Sling psychrometer, Line Tester, Tool Kit, Torch, vacuum pump, oil charging pump, Pressure testing kit etc. should also be always available with Plant Operator.

1.2.3 In case of any operator / helper being on leave, vendor shall immediately take advance action and provide substitution so that minimum manpower as indicated above is not reduced on any day. In case a particular shift duty Operator or helper does not turn up due to any reasons, the earlier duty person shall continue to make sure that System never remains unattended.

2.0 Maintenance of AC System

i. Maintenance work under scope of the vendor shall broadly include but in no way limited to the following:

- a) Preventive maintenance of the plant.
- b) Servicing of the plants and associated equipment's at regular interval
- c) Attending to complaints.
- d) Replacement of worn out or defective components
- e) Replacing of consumables as and when required.

No consumable or any other items of system shall be arranged by Customer and no extra payment shall be made by customer in this regard.

ii. Vendor shall be responsible at all time, during the entire period of contract for satisfactory performance of Ventilation system (including accessories) with zero down time. During emergency or breakdown, vendor's Engineer along with related technicians shall be available immediately even though it may be beyond normal working hours or on public holidays till the AC System is restored back into normal satisfactory condition. Response time for attending breakdown complaints shall not exceed 2 hours.



TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

- iii. Defective / worn out components shall be replaced only by genuine and original parts. OEM or its authorized dealer's invoice shall be submitted as proof of using genuine parts. All common spares required for Ventilation system shall normally be kept available in the plant by the vendor. However, for critical spares, the same shall be made available in not more than 72 hours from the time of break-down requiring such spare.
- iv. Preventive Maintenance, servicing of AC System equipment's and accessories etc. shall be done by vendor in a planned manner in consultation with concerned customer's engineer. Preventive maintenance and service should be done as per the recommendations / guidelines of various OEMs
- v. Major servicing & over handling of equipment's like fans, pumps, piping / ducting works, valves etc. shall be done by vendor once in a year.
- vi. In case any repair/services of particular equipment of system is to be carried out by vendor through OEM (or their authorized dealer), all the arrangements including tools, O&M spares etc. shall be the total responsibility of vendor.
- vii. Vendor shall arrange and maintain separate logbook register for services / maintenance of AC System. Record of work done for services/maintenance repairs etc. shall be recorded by vendor's engineer in this register. This register shall always be with updated records & shall be produced to customer's engineer on weekly basis or as & when required by him.
- viii. Vendor shall arrange and maintain sufficient stock of spares and consumable at site. Similarly, all necessary tools & instruments required for the purpose of servicing / maintenance / routine testing etc. shall also be arranged by vendor and should be available at site at all times.
- ix. Repairs / servicing works shall normally be done by vendor at site up to maximum possible extent. However, in case any equipment or accessories is essentially required to be taken by vendor out of the plant premises for repairing / servicing, all necessary arrangements including to and fro transportation shall be the responsibility of vendor. Vendor shall also inform concerned customer's engineer for doing procedural formalities (like issue of gate pass etc.), prior to taking out the materials out of Plant premises.
- x. In case bidder fails to supply the spares required for maintenance of the equipment, same shall be provided by BHEL at Bidders risk and cost.
- xi. Vendor shall be fully responsible for safety of his personal at all times. Vendor shall also be responsible for taking all safety precautions at all the times, especially during servicing / preventive maintenance and repairs of Ventilation System equipment's etc.
- xii. All the safety controls, inter locking etc. shall be positively checked at least once a month and same shall be recorded by vendor engineer
- xiii. Technicians & helpers engaged by the vendor shall wear uniform with nameplate for easy identification, while being within plant premises



TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

- xiv. Vendor's engineer shall be focal point for customer. He shall report to customer engineer on daily basis, for taking necessary instructions and to update the status of Ventilation system
- xv. If any damage to the equipment and its accessories has happened due to improper maintenance by bidder shall be recovered from the bidder.
- xvi. Bidder is to arrange all the safety gears like helmets, air plugs, safety shoes etc. during the maintenance for the O&M Staff.
- xvii. Bidder shall have to maintain storage shed along with site office during O & M contract also
- xviii. Fabrication and erection of platform/extra support for Ventilation areas if felt necessary during operation and maintenance of the system has to be done by the bidder.

Notes:

1. The bidder shall take approval from Engineer-in charge of BHEL by submitting organization Chart of O&M staff for this site clearly indicating man power deployment with their educational background & experience with supporting documents.
2. The bidder shall be solely and wholly responsible for safety and security of workers engaged in the job and the BHEL property. In case of any accident the contractor shall pay proper compensation to the workers as per workmen's compensation act and repair/replace BHEL property at their own cost & arrangement. The bidder shall also make adequate provision of insurance for their workers at their own cost to cover them against the risk of accident.
3. The bidder and their workers engaged in the job shall follow all safety rules at the time of execution of work. It shall be responsibility of the bidder to supply all safety equipment as necessary to its O&M staff.
4. Beyond general shift if any trouble/breakdown occurs in the plant, Maintenance team must reach the plant without any delay along with Engineer/Site In-charge.
5. No Person from the list of manpower shall leave the plant site without prior permission from the Engineer in charge of BHEL.
6. However, in operation part, if any person is absent, substitute must be given immediately otherwise proportionate deduction will be made
7. The replacement / substitute personnel for maintenance, manpower shall have the same educational qualification and experience.
8. If any additional manpower is required during O&M whatsoever under the scope of contract the same shall be made available by bidder in time within the cost. To cater the need of time bound maintenance jobs, the bidder shall depute additional manpower without any cost implication to BHEL



TECHNICAL SPECIFICATION
3x200MW + 4X500MW KORBA TPP
HVAC SYSTEM
O & M SERVICES

PE-TS-466- (571-13000-A)-A002

Rev. No. 00

9. During execution of work if any personnel is found not suitable for the job or his presence inside powerhouse premises is felt undesirable, the personnel has to be replaced within 15 days.

10. BHEL will not be responsible for payment towards idle labour charges

Water Quality Aspect in Air Conditioning System

Water plays a crucial role in water-cooled air-conditioning systems for condenser and heat exchanger cooling. Proper treatment is essential to maintain system efficiency and avoid issues such as:

Key Issues and Solutions:

1. Scaling:

- Caused by hardness salts (e.g., calcium bicarbonate).
- Preventive measures:
 - Convert temporary hardness with sulfuric acid.
 - Use soft water cautiously (may cause corrosion).
 - Use scale inhibitors and dispersants.

2. Corrosion:

- Electrochemical in nature; leads to metal damage.
- Controlled by:
 - Corrosion inhibitors.
 - Maintaining a slightly positive Langelier Saturation Index (LSI).
 - Appropriate material selection.

3. Microbial Fouling:

- Caused by algae, fungi, and bacteria.
- Controlled using oxidizing and non-oxidizing biocides (e.g., hypochlorite).

4. Dirt & Silt Fouling:

- Suspended particles cause deposits and under-deposit corrosion.
- Controlled by using dispersants.

5. Chilled Water System Concerns:

- Less prone to scaling, but leakage and microbes (like sulphate/nitrate reducers) can cause issues.
- Regular microbial analysis and biocide treatment are necessary

6. Recommendations:

- Analyse all water quality parameters (physical, chemical, biological).
- Use corrosion-resistant materials for soft/desalinated water.
- Maintain cooling water conductivity ($\leq 1500 \mu\text{S}/\text{cm}$) and pH (8–8.5).
- Implement regular chemical treatment and biocide dosing.
- For Vapour Absorption Machines (VAMs), monitor water quality per supplier guidelines.
- Maintain water quality logs and perform regular analysis of chilled water.

Statutory Compliance by the bidder:

All Statutory compliances related to Labour, Health & Safety, Quality & Environment protection and insurance shall be as per the tender GCC shall be followed by the bidder.