
	4X270 MW TSGENCO MANUGURU TPS	Document Number: PE-DC-K27-558-E001
	ANNEXURE OF DATASHEET	Revision: 00
		Date: 13-10-2014

ANNEXURE-I

AVERAGE LUX LEVEL & TYPE OF FIXTURES


S. No.	LOCATION	AVERAGE LUX LEVEL	TYPE OF LIGHTING FIXTURES
01	TG Hall operating floors	200	HPSV, high bay fixture with anodised Al reflector
02	TG hall ground, mezzanine floor	200	HPSV, Industrial well glass with integral control gear
03	Switchgear/ Charger rooms	200	FTL, Industrial type with vitreous enamel reflector
04	Central control room	300	FTL, Decorative recessed with wide angle, mirror optics, anti-glare type
05	Office areas, Conference rooms	300	FTL, Decorative recessed with wide angle, mirror optics, anti-glare type
06	UPS/ Operator room	300	FTL, Industrial type with vitreous enamel reflector
07	Battery rooms	200	FTL, corrosion proof, totally enclosed type with sheet aluminium housing.
08	Cable Vault	70	FTL, Industrial type with vitreous enamel reflector
09	Transformer yard	30 (General) 50 (On Equip)	HPSV, flood light, general purpose.
10	Boiler/ HRSG platforms	100	HPSV, dust proof/ dust tight well glass fixture
11	Boiler/ HRSG burner platforms	100	HPSV, dust proof/ dust tight well glass fixture
12	ESP platforms	100	HPSV, dust proof/ dust tight well glass fixture
13	ESP control room	300	FTL, Decorative recessed with wide angle, mirror optics, anti-glare type
14	DG room	200	HPSV, medium bay, industrial type.
15	AC plant/ Air washer room	200	FTL, industrial box type base without any cover.
16	Compressor room	150	HPSV, dust proof/ dust tight well glass fixture
17	Electrical/ Electronic Lab	300	FTL, Decorative recessed with wide angle, mirror optics, anti-glare type
18	Chemical Lab	300	FTL, corrosion proof, totally enclosed type with sheet aluminium housing.
19	Pump houses	150	HPSV, medium bay, industrial type.
20	Fuel Oil Pump house*	150	HPMV, well glass, flame proof with vitreous enamelled reflector and cast aluminium
21	Coal Mill area, feeder floor, bunker floor	100	HPSV, well glass, dust proof with vitreous enamelled reflector.
22	Street lighting	20 (Primary roads) 10 (Secondary roads)	HPSV, street light fixture
23	Corridors walk ways, staircase, toilets, wash rooms etc	70	FTL, Industrial type with vitreous enamel reflector

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	DESIGN MEMORANDUM FOR STATION LIGHTING SYSTEM	Revision: 00
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ANNEXURE-I

24	Unloading and maintenance bay	200	HPSV, high bay, industrial type.
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Note: * The fixture will be suitable for Division-2, Group IIA/IIB of hazardous area as per IS-2148.
Decorative type fixtures will be provided for false ceiling areas.

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	DESIGN MEMORANDUM FOR STATION LIGHTING SYSTEM						Revision: 00
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ANNEXURE-II

LIGHTING & LV POWER SERVICES IN DIFFERENT AREAS

S. No.	AREA	ACN	ACE	DCE	5/15A Socket	20A Socket	63/125A Socket	ELU \$
01	TG building	Y	Y	Y	Y*	Y	Y	-
02	Boiler platforms & boiler area	Y	Y	Y	-	Y	Y	-
03	ESP platforms & Mill area	Y	Y	Y	-	Y	Y	-
04	ID, FD & PA FAN area	Y	Y	Y	-	Y	Y	-
05	Transformer Yard	Y	Y	Y	-	Y	Y	-
06	ESP control room	Y	Y	Y	Y*	Y	Y	-
07	DG room	-	Y	Y	Y*	Y	Y	-
08	Compressor house	Y	Y	Y	Y*	Y	Y	-
09	Fuel oil area	Y	-	-	Y*	Y	Y	Y
10	Outdoor area	Y	-	-	-	-	-	-
10	Administrative building	Y	-	-	Y*	Y	Y	Y
12	Service building	Y	-	-	Y*	Y	Y	Y

LEGEND:

ACN:	AC Normal Lighting
ACE:	AC Emergency Lighting
DCE:	DC Emergency Lighting
Y:	YES
Y*:	YES, Only in control room, offices & toilets
\$:	Emergency Lighting Unit (ELU) & 5/15A Switch socket for ELU

4 X270W MANUGURU THERMAL POWER PLANT

13.0 CABLING

S.NO.	DESCRIPTION	VALUE
1.0	Cable Trays & Support System	
1.1	Cable trays & accessories	
(a)	Type of cable tray & accessories	Ladder Type & Perforated type, Hot dipped galvanised
(b)	Material	Hot Rolled Mild Steel
(c)	Standard Length of Straight Length of Cable Trays	2.5 metre
(d)	Rung spacing for ladder type tray	250 mm
(e))	Standard Width (mm) of cable trays	600, 450, 300 ,150
(f)	Depth of cable trays & acc.	100 mm
(g)	Bending Radius of Accessories(in mm)	600 mm
(h)	Tolerance in length/width / height	+ /- 2 mm
(i)	SHEET THICKNESS	
•	For cable trays & Accessories	2 mm
•	For Coupler plate	3 mm
(j)	Tolerance in Thickness	(+/-0.2 mm)
(k)	Horizontal runs of cable trays supported at	1.5 metre
(l)	Vertical runs of cable trays supported at	1 metre
1.2	Cable tray support system	
(a)	Type of cable support system	Site fabricated & welded type, Painted
(b)	Material:	Hot Rolled Mild Steel
(c)	Length	Standard length of 5.5m to 6.5m
(d)	Type:	Hot-dip galvanised
(e)	Sizes:	ISA 50X50X6/ISA 65X65X6 ISMC – 100/ISMC – 150 (As per requirement)
1.3	Surface Treatment of cable tray & support system	
(a)	Pre-treatment	IS 2629 before galvanisation
(b)	Type	Hot dip galvanisation
(c)	Applicable Standard	IS 2629
(d)	Minimum thickness	75 microns (minimum)
(e)	Min. weight of	610 grams per square meter

4 X270W MANUGURU THERMAL POWER PLANT

	Zinc deposit	
2.0	Rigid Conduits and Pipes	
2.1	Material	Galvanised steel
2.2	Type	Medium duty
2.3	Applicable Standard	IS: 9537 (upto 63mm OD) and IS:1239 (above 63mm OD)
3.0	Flexible Conduits and Pipes	
3.1	Material	Strip steel cold rolled & annealed
3.2	Type	Electro galvanised
3.3	Applicable Standard	IS:3480
4.0	Cable Glands	
4.1	Type of cable gland	Double compression, Brass
4.2	Applicable Standard	BS:6121 / Eqty.
5.0	6.6kV Cable Jointing / Termination Kits	
5.1	Type	Tapex / Heat Shrinkable/ Push On/ Elastimold
5.2	Application	Indoor
5.3	Type of cable lugs/ferrule	Aluminium solderless crimping type
5.4	Applicable Standard	Type test reports as per IS:13573 will be submitted
6.0	Cable lugs	
6.1	Type	Aluminium (solderless crimping type) for Al conductor Tinned Copper (solderless crimping type) for Cu conductor
6.2	Applicable Standard	IS: 8309 / Eqty.
7.0	TREFOIL CLAMPS(For single core power cables)	
7.1	Material	Nylon-6/ Aluminium alloy
7.2	Hardware	Hot Dip Galvanised/Zinc passivated / Cadmium Plated
7.3	Short circuit current values	105 kA (peak)
7.4	Spacing between trefoil clamps	1000 mm
8.0	Fire Sealing	
7.1	Fire rating of the system	Two (2) Hour

4 X270W MANUGURU THERMAL POWER PLANT

7.2	Type	Heat resistant panel / powder or mortar
7.3	Type tests are to be conducted or Reports of previously conducted type tests shall be submitted	Reports of previously conducted following type tests shall be submitted a) Accelerated ageing test b) Water absorption test c) Fire rating test d) Hose stream test
7.4	Testing standards	ASTM-E-814, ASTM-E-119, UL-1479, BS: 476
7.5	Shelf life	12 months

4 X270W MANUGURU THERMAL POWER PLANT

14.0 EARTHING AND LIGHTNING PROTECTION

S.NO.	DESCRIPTION	UNITS	VALUE
1.0	Earthing System		
1.1	Buried earth mat		
1.1.1	Applicable standard		IEEE: 80 & IEEE:665
1.1.2	Material		MS
1.1.3	Size		36 mm dia rod
1.2	Equipment Earthing		
1.2.1	Material		MS flat / GS wire
1.2.2	No. of leads		Generally two
1.3	Lightning Protection System		
1.3.1	Applicable Standard		IS:2309
1.3.2	Size & material for Horizontal Air termination		50x6mm galvanised MS strip
1.3.3	Size & material for Vertical Air termination		20mm dia, 1000mm long galvanised MS rod
1.3.4	Size & material for Vertical Air termination for chimney		20mm dia, 1000mm long, 2mm thick copper rod
1.3.5	Size & material for down conductor		50x6mm galvanised MS strip



TITLE

LV MOTORS

DATA SHEET-A

4 X 270 MW TSGENCO MANUGURU TPS

SPECIFICATION NO.

VOLUME

II B

SECTION

D

REV NO.

DATE

22.11.2014

SHEET

1

OF

2

- 1.0 Design ambient temperature : 50 °C
- 2.0 Maximum acceptable kW rating of LV motor : 160KW *
- 3.0 Installation (Indoors/ Outdoors) : As required
- 4.0 Details of supply system
 - a) Rated voltage (with variation) : 415V \pm 10%
 - b) Rated frequency (with variation) : 50 Hz + 3 % to - 5%
 - c) Combined voltage & freq. variation : 10% (sum of absolute values)
 - d) System fault level at rated voltage : 50 kA for 1 sec
 - e) Short time rating for terminal boxes
 - o 110 kW and above (Breaker : 50 KA for 0.20 sec.. Controlled)
 - o Below 110 kW (Contactor : 50 KA protected by HRC fuse Controlled)
 - f) LV System grounding : Solidly
- 5.0 Class of insulation : Class 'F', with temp rise limited to class B.
- 6.0 Minimum voltage for starting : (a) 85% below 110KW
(b) 80% from 110KW to 160KW
(c) 85% above 160KW to 1000KW
(d) 80% from 1001 KW to 4000KW
(e) 75% > 4000KW
(As percentage of rated voltage)
- 7.0 Power cables data : Shall be given during detailed engg.
- 8.0 Earth Conductor Size & Material : As per attached Datasheet of Earthing.
- 9.0 Space heater supply : 240 V, 1 ϕ , 50 Hz (for motors above 30 Kw)
- 10.0 Rating up to which Single phase motor : Acceptable below 0.20 kW
- 11.0 Locked rotor current
 - a) Limit as percentage of FLC : As per IS 12615*
- 12.0 Flame-proof motor
 - a) Enclosure suitable (As per IS: 2148) : As per requirement
 - b) Classification of Hazardous area : As per requirement
(As per IS: 5572 part-I)
- 13.0 Makes : BHEL/ Customer approval
- 14.0 Paint shade : Shall be given during detailed engg
- 15.0 Degree Of protection for motor/ terminal box : IP 54/ IP 55



TITLE

LV MOTORS**DATA SHEET-A****4 X 270 MW TSGENCO MANUGURU TPS**

SPECIFICATION NO.

VOLUME II B

SECTION D

REV NO. DATE 22.11.2014

SHEET 1 OF 2

* Continuous duty LT motors up to 160 KW Output rating (at 50 deg.C ambient temperature), shall be High efficiency (IE2) as per IEC: 60034-30/ IS:12615

16.0 TESTING**16.1 Type Tests**

For LT Motors above 55kW, type test reports for type tests as per IS: 325/ IS: 12615 conducted on equipment similar to those proposed to be supplied and carried out within last five years from the date of bid opening shall be submitted. However, if such reports are not available, one motor of each type shall be subjected to type tests for free of cost.

16.2 Routine Tests


All motors shall be subjected to routine tests as per IS: 325/ IS: 12615 in the presence of customer or customer representative.

[illegible]

SECTION D3


STANDARD TECHNICAL SPECIFICATION (C&I)

DATASHEET A & B

	SPECIFICATION FOR MOTORISED VALVE ACTUATOR	SPECIFICATION NO.: PE-SS-411-145-I007	
		VOLUME	
		SECTION	
		REV. NO. 00	DATE: 14.11.14
		SHEET 1	OF 3
Data Sheet A & B			
DATA SHEET-A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED-UP BY BIDDER)


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GENERAL*	* PROJECT	4 x 270 MW MANUGURU PROJECT	
	OFFER REFERENCE		
	* TAG NO. SERVICE		
	* DUTY	<input checked="" type="checkbox"/> ON / OFF <input checked="" type="checkbox"/> INCHING (AS REQUIRED)	
	* LINE SIZE (inlet/outlet): MATERIAL		
	* VALVE TYPE	<input type="checkbox"/> GLOBE <input type="checkbox"/> GATE <input type="checkbox"/> REG. GLOBE <input type="checkbox"/> BUTTERFLY	
	* OPENING / CLOSING TIME		
	* WORKING PRESSURE		
	AMBIENT CONDITION	SHALL BE SUITABLE FOR CONTINUOUS OPERATION UNDER AN AMBIENT TEMP. OF 0-55 DEG C AND RELATIVE HUMIDITY OF 0-95%	
	VALVE SEAT TEST PRESS	BIDDER TO SPECIFY	
	REQUIRED VALVE TORQUE	BIDDER TO SPECIFY	
	ACTUATOR RATED TORQUE	BIDDER TO SPECIFY	
	CONSTRUCTION AND SIZING	MECHANICAL POSITION INDICATOR	TO BE PROVIDED FOR 0-100% TRAVEL
BEARINGS		DOUBLE SHIELDED, GREASE LUBRICATED ANTI-FRICTION.	
GEAR TRAIN FOR LIMIT SWITCH/TORQUE SWITCH OPERATION		METAL (NOT FIBRE GEARS). SELF-LOCKING TO PREVENT DRIFT UNDER TORQUE SWITCH SPRING PRESSURE WHEN MOTOR IS DE-ENERGIZED.	
SIZING		OPEN/CLOSE AT RATED SPEED AGAINST DESIGNED DIFFERENTIAL PRESSURE AT 85% OF RATED VOLTAGE. FOR ISOLATING SERVICE THREE SUCCESSIVE OPEN-CLOSE OPERATIONS OR 15 MINS. WHICHEVER IS HIGHER. FOR INCHING(REGULATING) SERVICE 150 STARTS/HR MINIMUM	
HANDWHEEL	* REQUIRED	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	* ORIENTATION	<input type="checkbox"/> TOP MOUNTED <input type="checkbox"/> SIDE MOUNTED	
	TO DISENGAGE AUTOMATICALLY DURING MOTOR OPERATION.		
ELECTRIC ACTUATOR	ACTUATOR MAKE/MODEL	BIDDER TO SPECIFY	
	MOTOR MAKE / MODEL / TYPE / RATING (KW)	BIDDER TO SPECIFY	
	MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR, STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT.	
	ACTUATOR APPLICABLE WIRING DIAGRAM	<input checked="" type="checkbox"/> ENCLOSED (BIDDER TO CONFIRM) A: <input checked="" type="checkbox"/> DRG. NO. 3-V-MISC-24227 R00 B: <input type="checkbox"/> DRG. NO. 3-V-MISC-24550 R00 C: <input type="checkbox"/> DRG. NO. 3-V-MISC-24283 R00 D: <input type="checkbox"/> DRG. NO. 4-V-MISC-90271 R11	
	COLOUR SHADE	<input checked="" type="checkbox"/> BLUE (RAL 5012) ENAMEL <input type="checkbox"/>	
	SHAFT RPM	BIDDER TO SPECIFY	
	OLR SET VALUE	BIDDER TO SPECIFY	
	STARTING / FULL LOAD CURRENT	BIDDER TO SPECIFY	
	NO. OF REV FOR FULL TRAVEL	BIDDER TO SPECIFY	
	@ PWR SUPP TO MTR / STARTER	415V, 3PH, AC	
	@ CONTROL VOLTAGE REQUIREMENT	TO BE DERIVED INTERNALLY	
	@ ENCLOSURE CLASS OF MOTOR	<input type="checkbox"/> IP 65 <input checked="" type="checkbox"/> IP 67 <input type="checkbox"/> FLAME PROOF <input type="checkbox"/> IP 55, TOTALLY ENCL, SELF VENTILATED.	
	@ INSULATION CLASS	<input type="checkbox"/> CLASS-B <input checked="" type="checkbox"/> CLASS-F (TEMP. RISE LIMITED TO CLASS B)	
	@ WINDING TEMP PROTECTION	<input checked="" type="checkbox"/> THERMOSTAT (3 Nos., 1 IN EACH PHASE) <input type="checkbox"/> -----	

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		SECTION	
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		SHEET 2	OF 3
Data Sheet A & B			
DATA SHEET-A (TO BE FILLED BY PURCHASER)		DATA SHEET-B (TO BE FILLED-UP BY BIDDER)	

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	SINGLE PHASE / WRONG PHASE SEQUENCE PROTECTION	REQUIRED	
INTEGRAL STARTER	INTEGRAL STARTER	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	TYPE OF SWITCHING DEVICE	<input checked="" type="checkbox"/> CONTACTORS <input type="checkbox"/> THYRISTORS	
	TYPE	<input checked="" type="checkbox"/> CONVENTIONAL <input type="checkbox"/> SMART (NON-INTRUSIVE)	
	STEP DOWN CONT. TRANSFORMER	<input checked="" type="checkbox"/> REQUIRED	
	OPEN / CLOSE PB	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	STOP PB	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	INDICATING LAMPS	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	LOCAL REMOTE S/S	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
	STATUS CONTACTS FOR MONITORING	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED	
		INTEGRAL STARTER DISTURBED SIGNAL	REQUIRED (O/L RELAY OPERATED, CONT./POWER SUPPLY FAILED, S/S IN LOCAL, TORQUE SWITCH OPTD. MID WAY)
INTERPOSING RELAY (Applicable for integral Starter)	INTERPOSING RELAYS	REQUIRED	
	INTERPOSING RELAY (QUANTITY)	<input type="checkbox"/> 2 NOs. <input checked="" type="checkbox"/> 3 NOs.	
	DRIVING VOLTAGE	<input checked="" type="checkbox"/> 20.5 – 24V DC <input type="checkbox"/> _____ V DC	
	DRIVING CURRENT	<input checked="" type="checkbox"/> 125mA MAX <input type="checkbox"/> _____ mA MAX	
	LOAD RESISTANCE	<input checked="" type="checkbox"/> > 192 ohms - <25 k ohms <input type="checkbox"/> > _____ ohms - < _____ ohms	
TORQUE SWITCH	MFR & MODEL NO.	BIDDER TO SPECIFY	
	OPEN / CLOSE	<input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2Nos. / <input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2Nos	
	CONTACT TYPE	2 NO + 2 NC	
	RATING	5A 240V AC AND 0.5A 220V DC	
	CALIBRATED KNOBS(OPEN&CLOSE TS)	REQUIRED FOR SETTING DESIRED TORQUE	
	ACCURACY	+3% OF SET VALUE	
LIMIT SWITCH	MFR & MODEL NO.	BIDDER TO SPECIFY	
	OPEN : INT : CLOSE	<input checked="" type="checkbox"/> 1 No <input type="checkbox"/> 2 Nos.	2 Nos. (ADJ.) <input checked="" type="checkbox"/> 1 No. <input type="checkbox"/> 2Nos.
	CONTACT TYPE	2 NO + 2 NC	
	RATING (AC / DC)	5A 240V AC AND 0.5A 220V DC	

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		SHEET 3	OF 3
Data Sheet A & B			
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POSITION TRANSMITTER	POSITION TRANSMITTER (For inching duty)	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED		
	MFR & MODEL NO.	BIDDER TO SPECIFY		
	TYPE	<input checked="" type="checkbox"/> ELECTRONIC (2 WIRE) R/I CONVERTER <input type="checkbox"/> ELECTRONIC (2 WIRE) CONTACTLESS		
	SUPPLY	<input checked="" type="checkbox"/> 24V DC <input type="checkbox"/>		
	OUTPUT	<input checked="" type="checkbox"/> 4-20mA		
	ACCURACY	± 1% FS		
SPACE HEATER	@SPACE HEATER	REQUIRED		
	@ POWER SUPPLY			
	@ RATING	415v, 3PH, AC FOR RATING > 0.2KW; SINGLE PHASE FOR RATING < 0.2KW		
TERMINAL BOX	MOTOR TERMINAL BOX	REQUIRED		
	ACTUATOR TERMINAL BOX	REQUIRED		
	ENCL CLASS MTR T.B. / ACTUATOR T.B.	@ <input checked="" type="checkbox"/> IP 67 @ <input type="checkbox"/>	<input checked="" type="checkbox"/> IP67 <input type="checkbox"/>	
	@ EARTHING TERMINAL	REQUIRED		
	PLUG & SOCKET(9 PIN) (FOR COMMD, LS/TS FEED BACK, PoT)	<input type="checkbox"/> REQUIRED <input checked="" type="checkbox"/> NOT REQUIRED <input type="checkbox"/> 2 NOS. <input type="checkbox"/>		
CABLE GLANDS	@ POWER CABLE GLAND	SIZE:--DURING DETAIL ENGINEERING		
	@ SPACE HEATER CABLE GLAND	SIZE: 2C x 2.5 sq. mm		
	OTHER CONTROL CABLE GLANDS-1	<input checked="" type="checkbox"/> AS REQD.		
	OTHER CONTROL CABLE GLANDS-2	<input checked="" type="checkbox"/> AS REQD.		
WEIGHT	TOTAL WEIGHT (ACTUATOR + ACCESSORIES)	BIDDER TO SPECIFY		_____ Kg.

NOTES:

- SCOPE:** DESIGN, MANUFACTURE, INSPECTION, TESTING AND DELIVERY TO SITE OF ELECTRIC ACTUATOR FOR INCHING OR OPEN / CLOSE DUTY.
- CODES & STANDARDS:** DESIGN AND MATERIALS USED SHALL COMPLY WITH THE RELEVANT LATEST NATIONAL AND INTERNATIONAL STANDARD. AS A MINIMUM, THE FOLLOWING STANDARDS SHALL BE COMPLIED WITH:
IS-9334, IS-2147, IS-2148, IS-325, IS-2959, IS-4691 AND IS-4722
- TEMPERATURE RISE SHALL BE RESTRICTED TO 70 DEG. C FOR AMBIENT TEMPERATURE OF 50 DEG C.
- CABLE GLANDS OF DOUBLE COMPRESSION TYPE, BRASS MATERIAL SHALL BE PROVIDED.
- THE TORQUE SWITCHES SHALL BE PROVIDED WITH MECHANICAL LATCHING DEVICE TO PREVENT OPERATION WHEN UNSEATING FROM THE END POSITIONS. THE LATCHING DEVICE SHALL UNLATCH AS SOON AS THE VALVE LEAVES THE END POSITION. IF SUCH PROVISION IS NOT POSSIBLE, THE TORQUE SWITCHES SHALL BE BYPASSED BY END-POSITION LIMIT SWITCHES WHICH OPENS ON VALVE LEAVING END POSITION. THESE LIMIT SWITCHES ARE ADDITIONAL TO THE NUMBER OF LIMIT SWITCHES SPECIFIED ELSEWHERE.
- THE MOTOR SHALL OPERATE SATISFACTORILY UNDER THE +/- 10% SUPPLY VOLTAGE VARIATION AT RATED FREQUENCY, -5% TO +3% VARIATION IN FREQUENCY AT RATED SUPPLY VOLTAGE, SIMULTANEOUS VARIATION IN VOLTAGE & FREQUENCY THE SUM OF ABSOLUTE PERCENTAGE NOT EXCEEDING 10%.
- THE MOTOR SHALL BE SUITABLE FOR DIRECT ON LINE STARTING.

NOTES* = TO BE FILLED BY MPL (LEAD AGENCY), @= TO BE FILLED BY ES