



GOVERNMENT OF CHHATTISGARH
Public Works Department

SCHEDULE OF RATES
FOR
ELECTRICAL & MECHANICAL WORKS

With Effect From 10.06.2026

Issued By

ENGINEER-IN-CHIEF
CHHATTISGARH PWD
NIRMAN BHAWAN
NAVA RAIPUR, ATAL NAGAR (C.G.)

GOVERNMENT OF CHHATTISGARH
Public Works Department

Issued By

**Engineer-in-Chief
Chhattisgarh PWD
Nirman Bhawan
Nava Raipur, Atal Nagar (C.G.)**

Price : Rs. 500/-

© all right reserved

**कार्यालय प्रमुख अभियंता, लोक निर्माण विभाग,
निर्माण भवन, नार्थ ब्लॉक, सेक्टर 19, नवा रायपुर अटल नगर (छ.ग.)**

दूरभाष :- 0771-2512734

ई-मेल :- eincpwd-pb@cg.gov.in

ज्ञाप क्रं. 65011/777-C/एस.ओ.आर./26

नवा रायपुर अटल नगर, दिनांक 10/06/2026

// आदेश //

छत्तीसगढ़ शासन लोक निर्माण विभाग नवा रायपुर के आदेश क्रमांक GENS/16524/2026 PWD SECTION/Nivida नवा रायपुर दिनांक 03.06.2026 के परिपालन में छत्तीसगढ़ लोक निर्माण विभाग के विद्युत एवं यांत्रिकी कार्य हेतु वर्तमान में दिनांक 01.06.2020 से प्रभावशील दर अनुसूची से GST दर पृथक कर, नई दर अनुसूची एतद द्वारा दिनांक 10.06.2026 से प्रभावशील की जाती है। अतः इस कार्यालय के आदेश क्रं. 65011/767/एस.ओ.आर./26 नवा रायपुर अटल नगर दिनांक 10.04.2026 को छत्तीसगढ़ लोक निर्माण विभाग के विद्युत एवं यांत्रिकी कार्य हेतु वर्तमान में दिनांक 01.06.2020 से प्रभावशील दर अनुसूची से GST दर पृथक कर, नई दर अनुसूची जारी किया गया था, जिस पर तत्काल प्रभाव से रोक लगाई जाती है।


प्रमुख अभियंता


लोक निर्माण विभाग
नवा रायपुर अटल नगर (छ.ग.)

पृ. क्रं. 65011/777-C/एस.ओ.आर./26

नवा रायपुर अटल नगर, दिनांक 10/06/2026

प्रतिलिपि:-

1. निज सचिव, माननीय मंत्रीजी, छ.ग. शासन, लोक निर्माण विभाग, नवा रायपुर
2. सचिव, छ.ग. शासन, लो.नि.वि., मंत्रालय-महानदी भवन नवा रायपुर अटल नगर,
3. सचिव, छ.ग. शासन, वित्त विभाग, मंत्रालय-महानदी भवन नवा रायपुर अटल नगर,
4. महानिदेशक (सड़क विकास) सड़क परिवहन एवं राजमार्ग मंत्रालय, ट्रांसपोर्ट भवन,
1 संसद मार्ग, नई दिल्ली-110001
5. महालेखाकार, छत्तीसगढ़ रायपुर
6. मुख्य तकनीकी परीक्षक (सर्तकता), छत्तीसगढ़ नवा रायपुर अटल नगर
7. संभाग आयुक्त, रायपुर/दुर्ग/बिलासपुर/अम्बिकापुर/जगदलपुर
8. जिलाधीश - जिला.....छत्तीसगढ़
9. क्षेत्रीय अधिकारी, सड़क परिवहन एवं राजमार्ग मंत्रालय, रा.रा. मार्ग परिसर, पेंशनबाड़ा
रायपुर
10. मुख्य अभियंता, लोक निर्माण विभाग,परिक्षेत्र.....
11. अधीक्षण अभियंता, लोक निर्माण विभाग,मण्डल.....
12. कार्यपालन अभियंता, लोक निर्माण विभाग, संभाग.....
13. कार्यपालन अभियंता, नगर निगम रायपुर
14. इस कार्यालय के सर्वर रूम की ओर विभाग के साईट में अपलोड करने हेतु अग्रेषित।
15. इस कार्यालय के निविदा/सामान्य/कार्य/योजना/सर्तकता खण्ड की ओर सूचनार्थ
एवं आवश्यक कार्यवाही हेतु अग्रेषित।

सहपत्र :- दर अनुसूची (विद्युत एवं यांत्रिकी कार्य) 10.06.2026


प्रमुख अभियंता


लोक निर्माण विभाग
नवा रायपुर अटल नगर (छ.ग.)

**Office of the Engineer in Chief
Public Works Department Chhattisgarh (Nava Raipur)**

No. - 65011 / 777 - C / (E&M) SOR / 2026 NAVA RAIPUR Dated: 10.06.2026

PREAMBLE

The schedule of rates published by PWD is an important document as this does not only serve as an useful tool for estimation, evaluation & execution of Government works by PWD officials but also referred to as an authority for other Government, Semi Government & private entities like builders, architects and consultants.

The Schedule of rates (SOR) 01.06.2020 for E&M works was published in 2020.

As Per the instruction issued by Government of Chhattisgarh, Public Works Department vide letter no GENS/16524 /2026 PWD SECTION / Nivida Nava Raipur Dated 03.06.2026, G.S.T shall be paid as extra, For this purpose rates of all the items have been reduced by 15% from E&M SOR 01.06.2020 and now it is modified as E&M SOR 10.06.2026, This SOR will be known as E&M SOR 10.06.2026.

Considerable efforts have been made to incorporate above changes but there always remains scope of betterment. Suggestion in this regard shall be highly welcomed.

Though every possible care has been taken in preparing this SOR but in a work like this, the chances of typographical and other errors cannot be ruled out. It will be appreciated, if these could be through to notice.

I sincerely express my gratitude and thanks to Shri T.R. Kunjam, Chief Engineer (E&M) PWD Zone-1 Raipur, who have taken immense pain in inspiring and guiding his entire team for making this document comprehensive and unique.

I would also commend Shri Suresh Bhupal, Superintending Engineer (E&M), Shri R.L. Gayakwad, Executive Engineer (E&M), Shri Abdul Waris, Executive Engineer (E&M), Mrs. Pooja Shukla, Assistant Engineer (E&M), Shri Rajeev Banjare S.D.O. (E&M), Shri C.M. Prasad, S.D.O. (E&M), Shri Hemsingh Patel, S.D.O. (E&M), Shri Umesh Dwivedi, Sub Engineer (E&M), Ms. Garima Nihlani, Sub Engineer (E&M), Shri Radhe Shyam Komarra, Sub Engineer (E&M), for their continuous untiring efforts in the above mission.

The work has been made possible with the sincere efforts of several other persons, institutions. It does not possible here to name them all, but we sincerely acknowledge with thanks the help and cooperation extended by them.

This SOR is available on the department website www.cg.nic.in/pwdraipur also.


Vijay Kumar Bhatpahari
E-in-C PWD, Chhattisgarh

**OFFICE OF THE ENGINEER-IN-CHIEF
P.W.D. NIRMAN BHAVAN, NORTH BLOCK, SECTOR-19 NAWA
RAIPUR, ATAL NAGAR (CHHATTISGARH)**

AMMENDMENT NO. 2

No. 65011/777-D/SOR/

Nawa Raipur, Atal Nagar Dated 10/06/2026

छत्तीसगढ़ शासन लोक निर्माण विभाग नवा रायपुर के आदेश क्रमांक GENS/16524/2026 PWD SECTION/Nivida नवा रायपुर दिनांक 03.06.2026 द्वारा निर्माण कार्यों में जी.एस.टी. के संबंध में परिपत्र जारी करते हुए लोक निर्माण विभाग में लागू निविदा अनुबंध की कंडिकाओं में Tax Clause में संशोधन जारी किये हैं तथा इस परिपत्र के बिन्दु क्रमांक-2 में निम्नानुसार लेख किया गया है :-

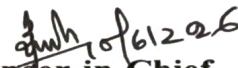
(2) संशोधित निविदा प्रपत्रों (Excluding GST (18%), GST to be paid separately) पर निविदा आमंत्रित करने पर, वर्तमान में प्राप्त हो रहे प्रचलित निविदा दर के संदर्भ में, कार्य के कृत्रिम लागत वृद्धि के प्रभाव को निष्क्रिय (Nullified) करने के लिए निम्नानुसार कार्यवाही किया जावे :-

(A) संशोधित निविदा प्रपत्र (Excluding GST, GST to be paid separately) पर आगामी निविदा आमंत्रण हेतु, पूर्व से स्वीकृत कार्य की अनुमानित लागत, PAC को दर सहित 15.25% (Round off 15.00%) कम करते हुए समायोजित कर लिया जावे, जिससे स्वीकृत कार्यों हेतु GST बाबत अलग से स्वीकृति नहीं लेनी पड़ेगी।

(B) आगामी प्रशासकीय स्वीकृति प्राप्त करने हेतु प्राक्कलन बनाते समय दर को 15.25% (Round off 15.00%) कम करके लिया जावे एवं उस पर अलग से 18% GST जोड़कर प्रशासकीय स्वीकृतियों प्राप्त की जावें।

छत्तीसगढ़ शासन द्वारा जारी उपरोक्त परिपत्र के पालन हेतु छत्तीसगढ़ लोक निर्माण विभाग में प्रचलित विद्युत एवं यांत्रिकी एसओआर 2020 जो प्रमुख अभियंता कार्यालय के आदेश क्रमांक 65011/427 Work Dated 01.06.2020 से प्रभावशील है, इस विद्युत एवं यांत्रिकी एसओआर. 01.06.2020 के सभी आयटमों के दर में 15 प्रतिशत कम करके संशोधित दर अनुसूची विद्युत एवं यांत्रिकी एसओआर. दिनांक 10.06.2026 जारी किया जाता है।

जिन कार्यों की प्रशासकीय स्वीकृति विद्युत एवं यांत्रिकी एस.ओ.आर. 2020 से प्राप्त हुई है तथा छत्तीसगढ़ शासन के पत्र क्रमांक File GENS/16524/2026 PWD SECTION/Nivida अटल नगर दिनांक 04.06.2026 के अनुसार दिनांक 20.06.2026 के पश्चात् आमंत्रित की जाने वाली निविदाओं में विद्युत एवं यांत्रिकी एस.ओ.आर. 01.06.2020 के स्थान पर संशोधित विद्युत एवं यांत्रिकी एस.ओ.आर. दिनांक 10.06.2026 के आधार पर तथा छत्तीसगढ़ शासन के परिपत्र दिनांक 03.06.2026 के संशोधन को लागू करते हुए निविदा आमंत्रित किया जावे।


Engineer-in-Chief
Public Works Department
Nawa Raipur, Atal Nagar (C.G.)

No. 65011/777-D/SOR/
Copy to the

Nawa Raipur, Atal Nagar Dated 10/06/2026

1. P.A. to honorable Minister of P.W.D.C.G. Govt. Raipur.
2. Secretary, C.G. Govt. P.W.D. Nawa Raipur Atal Nagar.
3. Secretary, Finance Department C.G. Govt. Nawa Raipur Atal Nagar.
4. All Chief Engineers. P.W.D. Chhattisgarh.
5. All Superintending Engineer, P.W.D. Chhattisgarh.
6. Chief Technical Examiner (V) C.G. Nawa Raipur.
7. Accountant General, C.G. Raipur.
8. All Collectors, Chhattisgarh.
9. All Executive Engineer, P.W.D. Chhattisgarh.
10. Website Public Works Department <http://pwd.cg.nic.in>.


Engineer-in-Chief
Public Works Department
Nawa Raipur, Atal Nagar (C.G.)

CONTENTS

S. No	NAME OF CHAPTER/ SUBHEAD	PAGE NO.
0	GENERAL NOTE	6
1	WIRING IN CONCEALED PVC CONDUIT	9
2	WIRING IN SURFACE PVC CONDUIT	18
3	WIRING IN EXISTING STEEL/PVC CONDUIT	23
4	METAL, WOODEN AND PVC BOXES	28
5	SWITCHES & ACCESSORIES	30
6	FANS, LUMINARIES AND LAMPS	33
7	MAIN METAL BOARD, BBC, IC	59
8	RISING MAINS	71
9	MAIN SWITCHES, MCCB'S, MCB'S, MCB DB'S	83
10	ACB, STARTER, CONTACTOR, PANEL ACCESSORIES	91
11	UPS, INVERTOR	97
12	E A R T H I N G	98
13	LIGHTENING CONDUCTOR	105
14	HDPE, GI, RCC PIPE	110
15	MV CABLE LAYING (1.1KV)	112
16	H V CABLE LAYING (11 KV)	135
17	H V CABLE LAYING (33 KV)	141
18	CABLE TRAYS AND ROUTE MARKERS	145
19	POLE AND POLE ERECTION	151
20	OVER HEAD LINES	177
21	TRANSFORMER & DG SETS	182
22	LIFTS	186
23	WATER SUPPLY PUMPS	202
24	AIR CONDITIONERS (WT/SPLIT)	210
25	HVAC	216
26	FIRE ARARM SYSTEM	239
27	CCTV SYSTEM & EPABX	244
28	SOUND SYSTEM	252
29	DISMANTLING	263
30	MINOR CIVIL WORKS	265
31	MAINTENANCE	267
32	SUPPLY ITEMS	269
33	MISCELLANEOUS	292

0 - GENERAL NOTE

Reference mentioned herein shall be applicable to all sections to the extent the context permits and are intended to supplement the provisions in the particular section. In case of any discrepancy/ deviation the provisions in the particular section shall take precedence.

The rates for all items of work unless clearly specified otherwise, shall include cost of all labour, materials, machinery and other inputs involved in the execution of the items.

This SOR is based on CPWD specifications. The execution of items of this SOR is to be done as per CPWD specifications amended upto date and as per all applicable BIS codes and standards.

INTERPRETATIONS

The Engineer-in-Chief, PWD Chhattisgarh shall be the sole deciding authority as to the meaning, interpretation and implications for various provisions of the specifications. His decision in writing shall be final.

Wherever any reference is made to any Indian Standard, It shall be taken as reference to the latest edition with all amendments issued thereto. In the event of any variation between the specifications mentioned before the each chapter and the Indian Standard, than CPWD specifications shall be followed.

DEFINITIONS

The following terms and expressions in the specification shall have the meaning or implication hereby assigned to them unless otherwise specified elsewhere.

Contractor: The 'Contractor' shall mean the individual or firm or company whether incorporated or not undertaking the works and shall include the legal personal representatives of such individual or the persons composing such firm or company, or the successors of such individual or firm or company and the permitted assignees of such individual or firm or company.

Engineer-in-Charge: The 'Engineer-in-Charge' means the Engineer officer who shall supervise and be incharge of the work and who shall sign the contract on behalf of the Governor.

Site: The 'site' shall mean the land/ or other places, on or through which the work is to be executed under the contract or any adjacent land, path or street through which the work is to be executed under the contract, or any adjacent land, path or street which may be allotted or used for the purpose of carrying out the contract.

Store: The 'store' shall mean the place of issue of materials included in the appropriate schedule of a contract for issue by the PWD. In all other cases 'Store' shall mean any PWD store in the district.

IS: The standards, specification and Code of Practices issued by the Bureau of Indian Standards.

CHAPTER 0 - GENERAL NOTE

Best: The word 'best' when used shall mean that in the opinion of the Engineer-in-Charge, there is no superior material/ article and workmanship obtainable in the market and trade respectively. As far as possible the standard required shall be specified in preference to the word 'Best'.

Department: 'Department' shall mean Public Works Department or PWD.

MEASUREMENTS

In booking dimensions, the order shall be consistent and in the sequence of length width and height or depth or thickness.

Rounding off: Rounding off where required shall be done in accordance with IS: 2-1960. The number of significant places rounded in the rounded off value should be as specified.

MATERIALS

Samples of all materials to be used on the work shall be got approved by the contractor from the Engineer-in-Charge well in time. The approved samples duly authenticated and sealed shall be kept in the custody of the Engineer-in-Charge till the completion of the work. All materials to be provided by the contractor shall be brand new and as per the samples approved by the Engineer-in-Charge

Mandatory tests are required to be carried out as per relevant IS: code. Testing of samples shall be done in the laboratory approved by the Engineer-in-Charge.

Samples, whether submitted for approval to govern bulk supplies or required for testing before use and also the samples of materials bearing 'Standard mark,' if required for testing shall be provided free of cost by the contractor. All other incidental expenditure to be incurred for testing of samples e.g. packaging sealing transportation loading unloading etc. except testing charges for conducting test if any, shall be borne by the contractor.

The materials, supplied by the Department shall be deemed to be complying with the specifications.

Materials stored at site, depending upon the individual characteristics, shall be protected from atmospheric effects due to rain, sun, wind and moisture to avoid deterioration.

Materials like paints etc. shall be stored in such a way that there may not be any possibility of fire hazards. Inflammable materials and explosives shall be stored in accordance with the relevant rules and regulations or as approved by Engineer-in-Charge in writing so as to ensure desired safety during storage.

The unit weight of materials unless otherwise specified shall be reckoned as given in IS: 1911-1967.

CHAPTER 0 - GENERAL NOTE

WAGES TO LABOUR:

The contractor shall be bound to pay the wages to the labourers, as per minimum wages act, rule and other instructions issued by State Govt. from time to time.

SAFETY IN WORK

The contractor shall employ only such methods of execution of work, tools and plant as are appropriate for the type of work or as approved by Engineer-in-Charge. If the contractor fails to comply the orders of Engineer-in-Charge/ department with respect to safety measures, and if any untoward incidents happen, the contractors will be solely responsible.

The contractor shall take all precautions and measures to ensure safety of works and workman and shall be fully responsible for the same. Safety pertaining to works such as excavation, trenching, scaffolds, ladders working platforms, electric and gas welding, use of hoisting and construction machinery shall be governed by PWD specifications, CPWD specification, relevant safety codes and the direction of Engineer-in-Charge.

CHAPTER 1 - WIRING IN CONCEALED PVC CONDUIT

(A) DEFINITION:

- (i) **POINT WIRING:** Point wiring means wiring from switch box to connector or ceiling rose for light/ fan/ call bell/ exhaust fan/ twin control light/ group control light and from Distribution board to switch box for light plug point/ power plug point.

The wiring system for point wiring shall be looping system. Phase/ live conductors shall be looped in the switch box, neutral wire/ earth wire shall be looped in the switch box for the 1st point and from point outlets for subsequent points. In wiring no joints will be permitted anywhere, except in switch box or point outlets, where jointing or wires will be allowed with use of suitable connector.

Points are categorized based on length of live conductor as under:

Table 1

S.No	Category	Length
1	Short point	Up to 3 metre
2	Medium point	Beyond 3 metre and up to 6 metre
3	Long point	Beyond 6 metre and up to 10 metre
4	Extra Long point I	Beyond 10 metre and up to 15 metre
5	Extra Long point II	Beyond 15 metre and up to 20 metre
6	Extra Long point III	Beyond 20 metre and up to 25 metre

- (i) **Submain wiring:** Submain wiring means the wiring from one main/ distribution board to another main/ distribution board. Every single-phase sub-main will have one phase, one neutral and one earth continuity conductor. The 3- phase sub-main wiring will have three phase, one neutral and two earth continuity conductors.
- (ii) **Circuit wiring:** Circuit wiring shall mean the wiring from the distribution board to the 1st tapping nearest switch box, from where point wiring starts. Every single-phase circuit will have one phase, one neutral and one earth continuity conductor. The 3- phase circuit will have three phase, one neutral and two earth continuity conductors.
- (iii) **Earth Conductor:** The material of earth conductors shall be the same as of phase conductor.

The size of earth conductor shall be the same size as phase conductor for wiring of conductor size up to 16 Sqmm. The size of earth conductor shall be 16 sq.mm for wiring of conductor size above 16 sq.mm and up to 35 sq mm.

The earth pin of socket outlets as well as metallic body of fan regulators shall be connected to the earth conductor. Twisted earth connections shall not be accepted in any case

(B) SCOPE OF WORK

The following shall be deemed to be included in scope of work

- (i) **POINT WIRING:** All material i.e. wires, conduit, bend, junction box, saddle/ iron clips/ hooks, screws, rawl plug, connector, ceiling rose switch box, phenolic laminated sheet or modular base & cover plate, control switch or MCB, socket as specified, chase cutting and repairing with mortar etc required for shall be include in the scope of point wiring.

CHAPTER 1 - WIRING IN CONCEALED PVC CONDUIT

- (ii) **Circuit/ Submain wiring:** All material i.e. wires, conduit , bend, junction box, saddle/ iron clips/ hooks, screws, rawl plug, chase cutting and repairing with mortar etc required shall be including in the scope of sub main wiring.
- (iii) **Painting:** M.S. Switches boxes shall be painted with 2 coats of black enamel paint over coat of red oxide primer.
- (iv) **Building Repair:** All chases in wall shall be filled with 1:4 cement mortars after installation of pipe and finished neat. All floor opening made for carrying any wiring shall be suitably sealed after installation.
- (v) Any other thing required to make the item of work complete.

(C) MATERIAL: All material shall be of approved make:

- (i) **Conduit:** conduit shall be ISI marked FRLS PVC conduit(as per relevant IS code) of thickness not less then 2.0mm for upto 32mm dia and not less then 2.0mm for above 32mm dia.
- (ii) **Conduit accessories:** All conduit accessories shall be of threaded type, pin grip type or clamp grip type accessories shall not be used under any circumstances
- (iii) **Wires:** wires shall be ISI marked. Following colour coding of wires shall be followed in wiring:

Phase	:	Red/ Yellow/ Blue. (Three phase wiring)
Live	:	Red (Single phase wiring)
Neutral	:	Black
Earth	:	Yellow/Green.

The conductor resistance of wire/ cable used in wiring should not be more than the maximum specified value given in table below duly corrected with correction factor for the ambient temperate at the time of measurement of resistance.

Table for Maximum permissible resistance of conductor

Nominal Cross Sectional Area	Maximum Resistance of conductor at 20°C		
	Copper		Aluminium
	Plain	Tinned	
mm ²	ohm/km	ohm/km	ohm/km
0.5	36.0	36.7	-
0.75	24.5	24.8	-
1.0	18.1	18.2	-
1.5	12.1	12.2	18.1
2.5	7.41	7.56	12.1
4	4.61	4.70	7.41
6	3.08	3.11	4.61
10	1.83	1.84	3.08
16	1.15	1.16	1.91
25	0.727	-	1.20
35	0.524	-	0.868
50	0.387	-	0.641
70	0.268	-	0.443
95	0.193	-	0.320
120	0.153	-	0.253
150	0.124	-	0.206
185	-	-	0.164
240	-	-	0.125
300	-	-	0.100

CHAPTER 1 - WIRING IN CONCEALED PVC CONDUIT

Table for Temperature Correction Factors For Conductor Resistance
To Correct The Measured Resistance At T° C To 20° C

Temperature of Conductor at Time of measurement t°C	Temperature Correction Factor k	Temperature of Conductor at Time of measurement t°C	Temperature Correction Factor k
5	1.064	14	1.025
6	1.059	15	1.020
7	1.055	16	1.016
8	1.050	17	1.012
9	1.046	18	1.008
10	1.042	19	1.004
11	1.037	20	1.000
12	1.033	21	0.996
13	1.029	22	0.992
23	0.988	37	0.936
24	0.984	38	0.933
25	0.980	39	0.929
26	0.977	40	0.926
27	0.973	41	0.923
28	0.969	42	0.919
29	0.965	43	0.916
30	0.962	44	0.912
31	0.958	45	0.909
32	0.954	46	0.906
33	0.951	47	0.903
34	0.947	48	0.899
35	0.943	49	0.896
36	0.940	50	0.893

- (iv) Switch box: Switch box for piano type switches shall be made of MS sheet of thickness not less than 1.2mm for boxes upto 200mmX300mm size and above this size of thickness 1.6mm for modular switches the switch box shall be galvanized iron and of same make as of modular switches. Every switch box shall have at least one earth terminal.
- (v) Switch/ socket : switch, socket, bell push, etc shall be ISI marked:
- (vi) Modular base and cover plate: Modular base and cover plate shall be of same make as that of switch/ socket.
- (vii) Saddle: Saddle thickness and width shall not be less than 0.55mm and 19mm for conduit upto 25mm and not less than 0.99mm and 25mm respectively for conduit above 25mm dia.
- (viii) Phenolic laminated sheet: Phenolic laminated sheet shall be ISI marked and of thickness 3mm and shall be fixed on switch box with aluminium alloy/ cadmium plated iron screws.

NOTE: Conduit and conduit accessories shall be of FRLS PVC

1. **Conduit:** FRLS PVC conduit shall be ISI marked, rigid “ Medium class” and not less than 2mm thick.
2. **Conduit accessories:** All FRLS PVC conduit accessories shall be grip type.

CHAPTER 1 - WIRING IN CONCEALED PVC CONDUIT

3. **Conduit joints:** All joints shall be sealed / cemented with approved solvent cement. Damaged conduit pipes / fitting shall not be used in any case.

(D) EXECUTION OF WORK**(i) Fixing of conduit pipes:**

In chase the conduit pipe shall be fixed by means of staples, J- hooks, or saddles, at not more than 50cm apart. Junction boxes shall be provided at suitable locations.

In RCC, the conduit pipes shall be laid in position and fixed to the steel reinforcement bars firmly by steel binding wires before the concreting is done. Steel fish wire shall be laid in conduit if supplying & drawing of wire is not included in the scope of work. Cost of fish wire shall be paid extra.

- (ii) **Joint in wiring:** No twisted joints in phase, neutral, earth conductors shall be permitted. There shall be no joints in the through-runs of wires. If the length of circuit or submain is more than the length of a standard available coil, and is necessitating a through joint, such joints shall be made by means of mechanical connectors in suitable junction boxes.
- (iii) Termination of multithreaded conductors shall be done using suitable crimping type thimbles.
- (iv) **Capacity of Circuits:** Lighting circuit shall feed light/fan/exhaust fan/call bell points. Each circuit shall not have cumulative connected load of point more than 800 Watt. Power circuit will have only one outlet per circuit in office building and may have two outlets in residential building.
- (v) Power wiring shall be kept separate and distinct from light wiring from the level of circuit and onward.
- (vi) Essential, non-essential and UPS distribution will have a completely independent from main switchboard upto final wiring for each system.
- (vii) Position of switch box: If otherwise not specified the position of switch box shall normally be mounted with their bottom 1.25 metre above from floor level unless otherwise directed by the Engineer-in-charge. Socket out let in kitchen shall be provided 23cm above the working platform and away from the position of stove and sink.
- (viii) Maximum number of wire to be drawn in a conduit shall be as per table below.

As per IS code

Nominal cross sectional area of conductor in sq.mm	20 mm		25mm		32 mm		38 mm		51 mm	
	Straight	Bend	Straight	Bend	Straight	Bend	Straight	Bend	Straight	Bend
1.5	5	4	10	8	18	12	-	-	-	-
2.5	5	3	8	6	12	10	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-
16	-	-	2	2	3	3	6	5	10	7
25	-	-	-	-	3	2	5	3	8	6
35	-	-	-	-	-	-	3	2	6	5

CHAPTER 1 - WIRING IN CONCEALED PVC CONDUIT

(E) TESTING: Following testing shall be done by the contractor executing the work before energizing the installation

- (i) Polarity testing
- (ii) Earth continuity
- (iii) Insulation testing

(F) MEASUREMENT:

- (i) Point wiring: The length of Points shall be measured along live conductor from top of switch board to junction box in which connector of that point is provided. Based on the length of point, it will be put into the suitable category of points i.e. short or medium or long etc. Then points will be counted in numbers category wise.
- (ii) Twin control points shall be counted as two points from point outlet to control switch board to either side.
- (iii) Group control points shall be measured from switch board to first point outlet as one point and from first point outlet to next point outlet as second point and so on.
- (iv) Multiple controlled call bell point shall be measured from the call bell to the nearest connector meant for connection to bell push as one point, from that connector to the next one and so on, shall be treated as separate points.
- (v) The light, fan, call bell, twin control, group control points of length more than 10 metres shall be measured as long point and in addition extra length of point wiring beyond 10 metre shall be measured in actual length and size of conduit and actual number and size of wires drawn in conduit and paid separately. Loose wire for connection will not be measured.
- (vi) The light/ power plug points of length more than 25 metres shall be measured as Extra long point III and in addition extra length of point wiring beyond 25 metre shall be measured in actual length and size of conduit and actual number and size of wires drawn in conduit and paid separately. Loose wire for connection will not be measured.
- (vii) The point wiring in which working height from floor level is more than 4 metres, item no 1.14 shall be payable extra for such each every point to compensate extra effort and extra labour involved.
- (viii) Submain wiring: linear measurement shall be made along the length of conduit from edge of Main switch to edge of DB.
- (ix) Circuit wiring: linear measurement shall be made along the length of conduit from edge of DB to edge of switched board.

Note: (a) Measurement shall be done in linear basis in metres with minimum unit as 1 cm
 (b) Wire used for connection inside of DB or Meter board or switched board of length upto 0.3 metre on each end is included in the cost of submain/ Circuit wiring. If connection wire is more then 0.3 metre in length beyond edge of DB, switch board, extra length may be paid separately as supply and drawing of wires in existing conduit.

(G) RATE: Cost of all wire, conduit, junction box, switches, sockets, conductor etc. material, labour and machinery used in execution of work of point wiring/ circuit / submain wiring including cost of necessary testing included in the cost of item.

CHAPTER 1- WIRING IN CONCEALED PVC CONDUIT

Code No.	Description	Unit	Rate Rs.
WITH PIANO TYPE SWITCHES			
1.1	Wiring for light/ fan/ exhaust fan / call bell point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp piano type switch, phenolic laminated sheet, suitable size M.S. box etc as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.1.1	Short Point	Point	204.00
1.1.2	Medium Point	Point	320.00
1.1.3	Long Point	Point	399.00
1.2	Wiring for twin control light point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm), with 5/6 amp piano type switch, phenolic laminated sheet, suitable size M.S. box etc as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	283.00
1.3	Extra for providing and fixing light plug point on board in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) point wiring with piano type 3 pin 5/6 amp socket outlet and 5/6 amp switch including cost of phenolic laminated sheet and M.S. box etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	74.00
1.4	Wiring for light plug point with 3x2.5 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with piano type 6 amp switch and 3 pin 6 amps socket outlet with suitable size M.S. box, phenolic laminated sheet, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.4.1	Short Point	Point	300.00
1.4.2	Medium Point	Point	502.0
1.4.3	Long Point	Point	745.0
1.4.4	Extra Long Point I	Point	1091.0
1.4.5	Extra Long Point II	Point	1421.0
1.4.6	Extra Long Point III	Point	1735.00
1.5	Wiring for power plug point with 3x4 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with piano type 16 amp switch and 6 pin 16 amps socket outlet with suitable size M.S. box, phenolic laminated sheet, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		

Code No.	Description	Unit	Rate Rs.
1.5.1	Short Point	Point	422.00
1.5.2	Medium Point	Point	722.00
1.5.3	Long Point	Point	1068.00
1.5.4	Extra Long Point I	Point	1457.00
1.5.5	Extra Long Point II	Point	1880.00
1.5.6	Extra Long Point III	Point	2320.00
1.6	Wiring for power plug point with 3x6 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with 20amp 2 pole & earth, industrial type socket outlet, 32 amp "C" curve SP MCB, in sheet steel enclosure with metal plug top and chained metal cover for the socket out let, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.6.1	Short Point	Point	923.00
1.6.2	Medium Point	Point	1448.00
1.6.3	Long Point	Point	1803.00
1.6.4	Extra Long Point I	Point	2431.00
1.6.5	Extra Long Point II	Point	2895.00
1.6.6	Extra Long Point III	Point	3538.00
WITH MODULAR TYPE SWITCHES			
1.7	Wiring for light/ fan/ exhaust fan / call bell point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp modular switch, modular base and cover plate, suitable size G.I. box as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.7.1	Short Point	Point	226.00
1.7.2	Medium Point	Point	360.00
1.7.3	Long Point	Point	500.00
1.8	Wiring for twin control light point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp modular switch, modular base and cover plate, suitable size G.I. box as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	357.00
1.9	Extra for providing and fixing light plug point on board in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) point wiring with modular type 3 pin 5/6 amp socket outlet and 5/6 amp switch including cost of base and cover plate and G. I. box etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	184.00

Code No.	Description	Unit	Rate Rs.
1.10	Wiring for light plug point with 3x2.5 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with modular type 6 Amp switch and 3 pin 6 amps socket outlet with modular base and cover plate, suitable size G.I. box, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.10.1	Short Point	Point	376.00
1.10.2	Medium Point	Point	560.00
1.10.3	Long Point	Point	784.00
1.10.4	Extra Long Point I	Point	1107.00
1.10.5	Extra Long Point II	Point	1408.00
1.10.6	Extra Long Point III	Point	1696.00
1.11	Wiring for power plug point with 3x4 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with modular type 16 Amp switch and 6 pin 16 amps socket outlet with modular base and cover plate, suitable size G.I. box, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.11.1	Short Point	Point	501.00
1.11.2	Medium Point	Point	801.00
1.11.3	Long Point	Point	1148.00
1.11.4	Extra Long Point I	Point	1536.00
1.11.5	Extra Long Point II	Point	1968.00
1.11.6	Extra Long Point III	Point	2401.00
1.12	Wiring for power plug point with 3x6 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with modular type 32 Amp SPMCB "C" curve and 6 pin 20 amps socket outlet with modular base and cover plate, suitable size G.I. box, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.12.1	Short Point	Point	603.00
1.12.2	Medium Point	Point	995.00
1.12.3	Long Point	Point	1449.00
1.12.4	Extra Long Point I	Point	1977.00
1.12.5	Extra Long Point II	Point	2564.00
1.12.6	Extra Long Point III	Point	3152.00
1.13	Wiring for circuit/ sub main wiring along with earth wire with the following sizes of FRLS PVC insulated copper conductor, wire in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) as per		

Code No.	Description	Unit	Rate Rs.
	specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
1.13.1	3 X 1.5 sq. mm in 20mm conduit	Metre	78.00
1.13.2	3 X 2.5 sq. mm in 20mm conduit	Metre	94.00
1.13.3	6 X 2.5 sq. mm in 25mm conduit	Metre	146.00
1.13.4	9 X 2.5 sq. mm in 32mm conduit	Metre	202.00
1.13.5	12 X 2.5 sq. mm in 32mm conduit	Metre	245.00
1.13.6	3 X 4 sq. mm in 25mm conduit	Metre	123.00
1.13.7	3 X 6 sq. mm in 25mm conduit	Metre	155.00
1.13.8	3 X 10 sq. mm in 25mm conduit	Metre	230.00
1.13.9	3 X 16 sq. mm in 32mm conduit	Metre	337.00
1.13.10	2 X 25 sq. mm + 1 X 16 sq. mm in 32mm conduit	Metre	445.00
1.13.11	6 X 2.5 sq. mm in 32mm conduit	Metre	155.00
1.13.12	6 X 4 sq. mm in 32mm conduit	Metre	201.00
1.13.13	6 X 6 sq. mm in 32mm conduit	Metre	265.00
1.13.14	6 X 10 sq. mm in 40mm conduit	Metre	438.000
1.13.15	6 X 16 sq. mm in 50mm conduit	Metre	656.00
1.13.16	4 X 25 sq. mm + 2 X 16 sq. mm in 50mm conduit	Metre	864.00
1.13.17	4 X 35 sq. mm + 2 X 16 sq. mm in 50mm conduit	Metre	1075.00
1.14	Extra cost for point wiring in concealed in FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) at height above 4 meters from floor level for every 2 metres or part thereof, and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	9.00
1.15	Supplying and fixing of following sizes FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with accessories in concealed complete as per specification and IS: 9537 (2000 Part 5)		
1.15.1	20 mm	Metre	36.00
1.15.2	25 mm	Metre	45.00
1.15.3	32 mm	Metre	50.00
1.15.4	40 mm	Metre	64.00
1.15.5	50 mm	Metre	84.00
1.16	Extra for providing modular starter in power point wiring instead of modular 32 amp SPMCB and 16 amps socket outlet as per specification.	Point	111.00
1.17	Supplying and fixing of following sizes steel conduit along with accessories in concealed complete as per specification.		
1.17.1	20 mm	Metre	69.00
1.17.2	25 mm	Metre	82.00
1.17.3	32 mm	Metre	121.00
1.17.4	40 mm	Metre	184.00
1.17.5	50 mm	Metre	243.00

CHAPTER 2 - WIRING IN SURFACE PVC CONDUIT

All specifications for wiring in surface FRLS PVC conduit will be same as that of wiring in concealed steel conduit except the following:

Conduit and conduit accessories shall be of FRLS PVC

Conduit: FRLS PVC shall be ISI marked, rigid "Medium class" and not less than 2mm thick.

Conduit accessories: All FRLS PVC conduit accessories shall be grip type.

Saddles: Saddles for fixing conduits shall be heavy gauge non- metallic type with base

Fixing of conduit

Conduit pipes shall be fixed on surface of wall/ ceiling by saddles, secured to suitable approved plugs with screws at an interval of not more than 75 cm in vertical run and not more than 50cm in horizontal run on either side of the couplers or bends or similar fittings, saddles shall be fixed at a distance of not more than 30cm from the center of such fittings.

Conduit joints: All joints shall be sealed/ cemented with approved solvent cement.

Damaged conduit pipes/ fittings shall not be used in any case.

Code No.	Description	Unit	Rate Rs.
WITH PIANO TYPE SWITCHES			
2.1	Wiring for light/ fan/ exhaust fan / call bell point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp piano type switch, phenolic laminated sheet, suitable size M.S. box etc as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.1.1	Short Point	Point	179.00
2.1.2	Medium Point	Point	289.00
2.1.3	Long Point	Point	420.00
2.2	Wiring for twin control light point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in concealed FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp piano type switch, phenolic laminated sheet, suitable size M.S. box etc as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	235.00
2.3	Extra for providing and fixing light plug point on board in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) point wiring with piano type 3 pin 5/6 amp socket outlet and 5/6 amp switch including cost of phenolic laminated sheet and M.S. box etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	73.00

Code No.	Description	Unit	Rate Rs.
2.4	Wiring for light plug point with 3x2.5 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with piano type 6 amp switch and 3 pin 6 amps socket outlet with suitable size M.S. box, phenolic laminated sheet, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.4.1	Short Point	Point	238.00
2.4.2	Medium Point	Point	438.00
2.4.3	Long Point	Point	648.00
2.4.4	Extra Long Point I	Point	904.00
2.4.5	Extra Long Point II	Point	1187.00
2.4.6	Extra Long Point III	Point	1455.00
2.5	Wiring for power plug point with 3x4 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with piano type 16 amp switch and 6 pin 16 amps socket outlet with suitable size M.S. box, phenolic laminated sheet, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.5.1	Short Point	Point	353.00
2.5.2	Medium Point	Point	598.00
2.5.3	Long Point	Point	882.00
2.5.4	Extra Long Point I	Point	1237.00
2.5.5	Extra Long Point II	Point	1650.00
2.5.6	Extra Long Point III	Point	2246.00
2.6	Wiring for power plug point with 3x6 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with 20amp 2 pole & earth, industrial type socket outlet, 32amp "C" curve SP MCB, in sheet steel enclosure with metal plug top and chained metal cover for the socket out let, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.6.1	Short Point	Point	939.00
2.6.2	Medium Point	Point	1277.00
2.6.3	Long Point	Point	1632.00
2.6.4	Extra Long Point I	Point	2109.00
2.6.5	Extra Long Point II	Point	2690.00
2.6.6	Extra Long Point III	Point	3193.00

Code No.	Description	Unit	Rate Rs.
WITH MODULAR TYPE SWITCHES			
2.7	Wiring for light/ fan/ exhaust fan / call bell point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp modular switch, modular base and cover plate, suitable size G.I. box as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.7.1	Short Point	Point	193.00
2.7.2	Medium Point	Point	295.00
2.7.3	Long Point	Point	395.00
2.8	Wiring for twin control light point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) with 5/6 amp modular switch, modular base and cover plate, suitable size G.I. box as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	286.00
2.9	Extra for providing and fixing light plug point on board in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) point wiring with modular type 3 pin 5/6 amp socket outlet and 5/6 amp switch including cost of base and cover plate and G. I. box etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	189.00
2.10	Wiring for light plug point with 3x2.5 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with modular type 6 Amp switch and 3 pin 6 amps socket outlet with modular base and cover plate, suitable size G.I. box, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.10.1	Short Point	Point	363.00
2.10.2	Medium Point	Point	511.00
2.10.3	Long Point	Point	766.00
2.10.4	Extra Long Point I	Point	1029.00
2.10.5	Extra Long Point II	Point	1322.00
2.10.6	Extra Long Point III	Point	1597.00
2.11	Wiring for power plug point with 3x4 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with modular type 16 Amp switch and 6 pin 16 amps socket outlet with modular base and cover plate, suitable size G.I. box, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.11.1	Short Point	Point	440.00
2.11.2	Medium Point	Point	694.00

Code No.	Description	Unit	Rate Rs.
2.11.3	Long Point	Point	983.00
2.11.4	Extra Long Point I	Point	1347.00
2.11.5	Extra Long Point II	Point	1742.00
2.11.6	Extra Long Point III	Point	2118.00
2.12	Wiring for power plug point with 3x6 sq mm FRLS PVC insulated stranded copper conductor wire for phase, neutral and earth in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with modular type 32 Amp SPMCB "C" curve and 3 pin 20 amps socket outlet with modular base and cover plate, suitable size G.I. box, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.12.1	Short Point	Point	542.00
2.12.2	Medium Point	Point	888.00
2.12.3	Long Point	Point	1286.00
2.12.4	Extra Long Point I	Point	1789.00
2.12.5	Extra Long Point II	Point	2338.00
2.12.6	Extra Long Point III	Point	2868.00
2.13	Wiring for circuit/ sub main wiring along with earth wire with the following sizes of FRLS PVC insulated copper conductor, wire in surface FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) etc as per specification and IS: 694 (2010), IS: 9537 (2000 Part 5)		
2.13.1	3 X 1.5 sq. mm in 20mm conduit	Metre	57.00
2.13.2	3 X 2.5 sq. mm in 20mm conduit	Metre	74.00
2.13.3	6 X 2.5 sq. mm in 25mm conduit	Metre	132.00
2.13.4	9 X 2.5 sq. mm in 32mm conduit	Metre	185.00
2.13.5	12 X 2.5 sq. mm in 32mm conduit	Metre	228.00
2.13.6	3 X 4 sq. mm in 25mm conduit	Metre	109.00
2.13.7	3 X 6 sq. mm in 25mm conduit	Metre	141.00
2.13.8	3 X 10 sq. mm in 25mm conduit	Metre	215.00
2.13.9	3 X 16 sq. mm in 32mm conduit	Metre	321.00
2.13.10	2 X 25 sq. mm + 1 X 16 sq. mm in 32mm conduit	Metre	428.00
2.13.11	6 X 2.5 sq. mm in 32mm conduit	Metre	141.00
2.13.12	6 X 4 sq. mm in 32mm conduit	Metre	186.00
2.13.13	6 X 6 sq. mm in 32mm conduit	Metre	251.00
2.13.14	6 X 10 sq. mm in 40mm conduit	Metre	422.00
2.13.15	6 X 16 sq. mm in 50mm conduit	Metre	636.00
2.13.16	4 X 25 sq. mm + 2 X 16 sq. mm in 50mm conduit	Metre	837.00
2.13.17	4 X 35 sq. mm + 2 X 16 sq. mm in 50mm conduit	Metre	1067.00
2.14	Extra cost for point wiring in surface in FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) at height above 4 meters from floor level, for every 2 metres or part thereof and IS: 694 (2010), IS: 9537 (2000 Part 5)	Point	3.00

Code No.	Description	Unit	Rate Rs.
2.15	Supplying and fixing of following sizes FRLS PVC conduit (heavy duty, thickness of pipe should be 2 mm) along with accessories in surface complete as per specification and IS: 9537 (2000 Part 5)		
2.15.1	20 mm	Metre	27.00
2.15.2	25 mm	Metre	33.00
2.15.3	32 mm	Metre	43.00
2.15.4	40 mm	Metre	61.00
2.15.5	50 mm	Metre	81.00
2.16	Supplying and fixing of following sizes PVC casing capping along with accessories in surface complete as per specification and IS: 9537 (2000 Part 5).		
2.16.1	20x12 mm	Metre	24.00
2.16.2	25x16 mm	Metre	26.00
2.16.3	32x16 mm	Metre	27.00
2.17	Supplying and fixing of following sizes steel conduit along with accessories in surface including painting complete as per specification.		
2.17.1	20 mm	Metre	65.00
2.17.2	25 mm	Metre	78.00
2.17.3	32 mm	Metre	108.00
2.17.4	40 mm	Metre	167.00
2.17.5	50 mm	Metre	224.00

CHAPTER 3 - WIRING IN EXISTING CONCEALED/ SURFACE STEEL/ PVC CONDUIT

All specifications for wiring in existing surface /concealed steel/ PVC conduit will be same as that of wiring in concealed steel conduit:

(A) MEASUREMENT:

Supplying and drawing of wires in existing conduit for Submain/ circuit or other wiring: linear measurement shall be made along the length of conduit including length of wires in main switch/ DB/ switch boxes used in interconnection.

Measurement shall be done in linear basis in metres with minimum unit as 1 cm

(B) RATE: Cost of all material, labour and machinery used in execution of work of point wiring/ circuit / submain wiring including cost of necessary testing shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
3.1	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 3x1.5 sq. mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface / concealed, Steel/FRLS PVC conduit and providing and fixing 5A piano type switch, phenolic laminated sheet etc. as per specification and IS: 694 (2010)		
3.1.1	Short Point	Point	140.00
3.1.2	Medium Point	Point	203.00
3.1.3	Long Point	Point	263.00
3.2	Wiring for twin control light point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface/ concealed, steel/FRLS PVC conduit with 5/6 amp piano type switch, phenolic laminated sheet, suitable size M.S. box etc as per specification and IS: 694 (2010)	Point	172.00
3.3	Wiring for light plug point with 3x2.5 sq mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface / concealed, Steel/FRLS PVC conduit and providing and fixing piano type 6 amp switch and 3 pin 6 amps socket outlet, phenolic laminated sheet, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010)		
3.3.1	Short Point	Point	198.00
3.3.2	Medium Point	Point	332.00
3.3.3	Long Point	Point	489.00
3.3.4	Extra Long Point I	Point	691.00
3.3.5	Extra Long Point II	Point	915.00
3.3.6	Extra Long Point III	Point	1139.00

Code No.	Description	Unit	Rate Rs.
3.4	Wiring for power plug point with 3x4 sq mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface/ concealed, FRLS PVC conduit and providing and fixing piano type 16 amp switch and 6 pin 16 amps socket outlet, phenolic laminated sheet, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010)		
3.4.1	Short Point	Point	297.00
3.4.2	Medium Point	Point	496.00
3.4.3	Long Point	Point	727.00
3.4.4	Extra Long Point I	Point	1025.00
3.4.5	Extra Long Point II	Point	1357.00
3.4.6	Extra Long Point III	Point	1687.00
3.5	Wiring for power plug point with 3x6 sq mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface/ concealed, Steel/PVC conduit earthing the existing industrial socket outlet with same size wire etc. as per specification and IS: 694 (2010)		
3.5.1	Short Point	Point	271.00
3.5.2	Medium Point	Point	573.00
3.5.3	Long Point	Point	925.00
3.5.4	Extra Long Point I	Point	1377.00
3.5.5	Extra Long Point II	Point	1880.00
3.5.6	Extra Long Point III	Point	2383.00
3.6	Wiring for light point/ exhaust fan point/ call bell point with 3x1.5 sq. mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface / concealed, Steel/FRLS PVC conduit and providing and fixing 5/6 amp modular type switch, modular base and cover plate etc. as per specification and IS: 694 (2010)		
3.6.1	Short Point	Point	174.00
3.6.2	Medium Point	Point	236.00
3.6.3	Long Point	Point	297.00
3.7	Wiring for twin control light point with 3x1.5 Sqmm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface/ concealed, Steel/FRLS PVC conduit and providing and fixing 5/6 amp modular type switch, modular base and cover plate etc. as per specification and IS: 694 (2010)	Point	229.00
3.8	Wiring for light plug point with 3x2.5 sq mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface / concealed, Steel/FRLS PVC conduit and providing and fixing modular type 6 Amp switch and 3 pin 6 amps socket outlet, modular base and cover plate, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010)		
3.8.1	Short Point	Point	289.00

Code No.	Description	Unit	Rate Rs.
3.8.2	Medium Point	Point	424.00
3.8.3	Long Point	Point	581.00
3.8.4	Extra Long Point I	Point	782.00
3.8.5	Extra Long Point II	Point	1006.00
3.8.6	Extra Long Point III	Point	1231.00
3.9	Wiring for power plug point with 3x4 sq mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface / concealed, Steel/FRLS PVC conduit and providing and fixing modular type 16 Amp switch and 6 pin 16 amps socket outlet, modular base and cover plate, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010)		
3.9.1	Short Point	Point	366.00
3.9.2	Medium Point	Point	564.00
3.9.3	Long Point	Point	796.00
3.9.4	Extra Long Point I	Point	1095.00
3.9.5	Extra Long Point II	Point	1425.00
3.9.6	Extra Long Point III	Point	1757.00
3.10	Wiring for power plug point with 3x6 sq mm FRLS PVC insulated stranded copper conductor wire for Phase, Neutral & earth in existing surface / concealed Steel/FRLS PVC conduit and providing and fixing modular type 32 Amp SP MCB "C" curve and 3 pin 20 amps socket outlet, modular base and cover plate, earthing the switch box and socket outlet with same size wire etc. as per specification and IS: 694 (2010)		
3.10.1	Short Point	Point	479.00
3.10.2	Medium Point	Point	780.00
3.10.3	Long Point	Point	1132.00
3.10.4	Extra Long Point I	Point	1585.00
3.10.5	Extra Long Point II	Point	2088.00
3.10.6	Extra Long Point III	Point	2591.00
3.11	Supplying and drawing following sizes of FRLS PVC insulated copper conductor, multi strand wire in the existing surface/ concealed, FRLS PVC conduit /PVC casing capping as per specification and IS: 694 (2010)		
3.11.1	1 x 1.5 sq. mm	Metre	13.00
3.11.2	2 x 1.5 sq. mm	Metre	22.00
3.11.3	3 x 1.5 sq. mm	Metre	31.00
3.11.4	4 x 1.5 sq. mm	Metre	41.00
3.11.5	5 x 1.5 sq. mm	Metre	50.00
3.11.6	6 x 1.5 sq. mm	Metre	59.00
3.11.7	7 x 1.5 sq. mm	Metre	68.00
3.11.8	8 x 1.5 sq. mm	Metre	77.00
3.11.9	9 x 1.5 sq. mm	Metre	87.00
3.11.10	10 x 1.5 sq. mm	Metre	96.00

Code No.	Description	Unit	Rate Rs.
3.11.11	1 x 2.5 sq. mm	Metre	19.00
3.11.12	2 x 2.5 sq. mm	Metre	33.00
3.11.13	3 x 2.5 sq. mm	Metre	48.00
3.11.14	4 x 2.5 sq. mm	Metre	63.00
3.11.15	5 x 2.5 sq. mm	Metre	78.00
3.11.16	6 x 2.5 sq. mm	Metre	93.00
3.11.17	7 x 2.5 sq. mm	Metre	108.00
3.11.18	8 x 2.5 sq. mm	Metre	123.00
3.11.19	9 x 2.5 sq. mm	Metre	138.00
3.11.20	10 x 2.5 sq. mm	Metre	153.00
3.11.21	1 x 4 sq. mm	Metre	26.00
3.11.22	2 x 4 sq. mm	Metre	48.00
3.11.23	3 x 4 sq. mm	Metre	70.00
3.11.24	4 x 4 sq. mm	Metre	92.00
3.11.25	5 x 4 sq. mm	Metre	114.00
3.11.26	6 x 4 sq. mm	Metre	136.00
3.11.27	1 x 6 sq. mm	Metre	37.00
3.11.28	2 x 6 sq. mm	Metre	71.00
3.11.29	3 x 6 sq. mm	Metre	104.00
3.11.30	4 x 6 sq. mm	Metre	138.00
3.11.31	5 x 6 sq. mm	Metre	171.00
3.11.32	6 x 6 sq. mm	Metre	205.00
3.11.33	3 x 10 sq. mm	Metre	184.00
3.11.34	4 x 10 sq. mm	Metre	244.00
3.11.35	5 x 10 sq. mm	Metre	304.00
3.11.36	6 x 10 sq. mm	Metre	365.00
3.11.37	3 x 16 sq. mm	Metre	285.00
3.11.38	5 x 16 sq. mm	Metre	472.00
3.11.39	2 x 25 sq. mm + 1 x 16 sq. mm	Metre	395.00
3.11.40	3 x 25 sq. mm + 2 x 16 sq. mm	Metre	638.00
3.11.41	3 x 35 sq. mm + 2 x 16 sq. mm	Metre	815.00
3.12	Supplying and drawing following pair 0.5 mm FR PVC insulated copper conductor, unarmored telephone wire in the existing surface/ concealed Steel/FRLS PVC conduit as per specification.		
3.12.1	1 Pair	Metre	7.00
3.12.2	2 Pair	Metre	9.00
3.12.3	4 Pair	Metre	14.00
3.13	Supplying and drawing following grade co-axial TV wire FR PVC insulated, shielded with fine tinned copper braid and protected with PVC sheath in the existing surface/ concealed Steel/FRLS PVC conduit as per specification.		
3.13.1	RG-6 grade	Metre	12.00
3.13.2	RG-11 grade	Metre	23.00

Code No.	Description	Unit	Rate Rs.
3.14	Supplying and drawing UTP 4 pair Cat 6 LAN wire in existing surface/ concealed Steel/FRLS PVC conduit as per specification.	Metre	16.00
3.15	Supplying and drawing following pair 0.5 mm FR PVC insulated stranded copper conductor armoured telephone wire in the existing surface/ concealed Steel/ FRLS PVC conduit as per specification.		
3.15.1	10 Pair	Metre	57.00
3.15.2	20 Pair	Metre	140.00

CHAPTER 4 -METAL, WOODEN AND PVC BOXES

(A) MATERIALS:

M.S. box:

Metal box shall be made of MS sheet of thickness not less than 1.2mm for boxes upto 200mmX300mm size and above this size of thickness of MS sheet shall be 1.6mm.

For modular switches the switch box shall be galvanized iron and of same make as of modular switches.

Every switch box shall have at least one earth terminal.

G.I. Boxes:

G.I. box shall be of the same make as that of modular switches.

PVC Boxes:

PVC boxes shall be free from burs, fins, and internal roughness having wall thickness not less than 2mm thick and complying to IS: 14772:2000.

Wooden Boxes:

Wooden boxes shall be made from approved good quality local wood.

Phenolic laminated sheet:

Phenolic laminated sheet shall be ISI marked having thickness 3mm and shall be fixed on switch box with aluminium alloy/ cadmium plated iron screws.

(B) MEASUREMENT:

Numerical counting shall be made for switch boxes.

- (C) **RATE:** Cost of all material, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
4.1	Supplying and fixing of metal box of following sizes (nominal size) in recess with suitable size phenolic laminated sheet cover in front including painting etc as per specification.		
4.1.1	75 mm X 75 mm X 60 mm deep	Each	71.00
4.1.2	100 mm X 100 mm X 60 mm deep	Each	77.00
4.1.3	150 mm X 75 mm X 60 mm deep	Each	79.00
4.1.4	150 mm X 150 mm X 60 mm deep	Each	111.00
4.1.5	180 mm X 100 mm X 60 mm deep	Each	105.00
4.1.6	200 mm X 125 mm X 60 mm deep	Each	124.00
4.1.7	200 mm X 150 mm X 60 mm deep	Each	134.00
4.1.8	200 mm X 250 mm X 60 mm deep	Each	151.00
4.1.9	200 mm X 300 mm X 60 mm deep	Each	156.00
4.1.10	250 mm X 300 mm X 60 mm deep	Each	197.00
4.1.11	325 mm X 300 mm X 60 mm deep	Each	220.00
4.1.12	375 mm X 300 mm X 60 mm deep	Each	231.00

Code No.	Description	Unit	Rate Rs.
4.2	Supplying and fixing of following sizes wooden switch box made of wooden plank side wall and base including 3mm thick phenolic laminated sheet cover on surface complete as per specification		
4.2.1	100mmX100mm	Each	55.00
4.2.2	150mmX75mm	Each	56.00
4.2.3	150mmX150mm	Each	63.00
4.2.4	180mmX100mm	Each	60.00
4.2.5	200mmX150mm	Each	68.00
4.2.6	250mmX200mm	Each	67.00
4.2.7	300mmX350mm	Each	86.00
4.2.8	300mmX400mm	Each	86.00
4.3	Supplying and fixing of following sizes PVC switch box suitable for modular switches with modular base and cover plates on surface complete as per specification		
4.3.1	94 mm X 94 mm (1/2 Module)	Each	97.00
4.3.2	118mmX94mm (3 Module)	Each	113.00
4.3.3	150mmX94mm (4 Module)	Each	122.00
4.3.4	205mmX94mm (6 Module)	Each	151.00
4.3.5	8 Module	Each	184.00
4.3.6	12 Module	Each	219.00
4.3.7	16 Module	Each	263.00
4.4	Supplying and fixing following size/ modules, GI box along with modular base & cover plate for modular switches in recess etc as per specification.		
4.4.1	75mmX75mm (1/2 Module)	Each	84.00
4.4.2	100mmX75mm (3 Module)	Each	110.00
4.4.3	125mmX75mm (4 Module)	Each	120.00
4.4.4	200mmX75mm (6 Module)	Each	158.00
4.4.5	125mmX125mm (8 Module)	Each	192.00
4.4.6	200mmX150mm (12 Module)	Each	226.00
4.4.7	16 Module	Each	293.00
4.5	Supplying and fixing following Modular base & cover plate on existing modular metal boxes etc. as per specification.		
4.5.1	1 Module	Each	41.00
4.5.2	2 Module	Each	41.00
4.5.3	3 Module	Each	49.00
4.5.4	4 Module	Each	55.00
4.5.5	6 Module	Each	71.00
4.5.6	8 Module	Each	86.00
4.5.7	12 Module	Each	114.00
4.5.8	16 Module	Each	148.00

CHAPTER 5 - SWITCHES & ACCESSORIES

(A) MATERIALS:

All switches, socket, plugs tops, MCB's and other accessories shall be of approved make and ISI marked only. All other accessories, for which ISI certification has not been issued, shall be of reputed and approved make.

(C) MEASUREMENT:

Items of work shall be measured by counting in numbers.

(D) RATE: Cost of all material, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
5.1	Supplying and fixing following piano type switch, socket, other accessories on the existing switch box/ cover including connections etc. as per specification.		
5.1.1	5/6 amps one way switch	Each	21.00
5.1.2	5/6 amps two way switch	Each	26.00
5.1.3	Bell push	Each	26.00
5.1.4	15/16 amps switch	Each	50.00
5.1.5	3 pin 5/6 amp socket outlet	Each	36.00
5.1.6	6 pin 15/16 amp socket outlet	Each	62.00
5.1.7	Plug Top 3 pin 5/6 Amps (For light plug).	Each	32.00
5.1.8	Plug Top 3 pin 16 Amps (For power plug).	Each	43.00
5.1.9	Telephone socket outlet	Each	45.00
5.1.10	TV antenna socket outlet	Each	28.00
5.1.11	Computer outlet jack	Each	37.00
5.1.12	Fan regulator Electronic, step type moving all round	Each	111.00
5.1.13	Ceiling rose 3 pin 5/6 amps	Each	27.00
5.1.14	Pendent holder	Each	36.00
5.1.15	Batten/ angle holder	Each	32.00
5.2	Providing and fixing composite board for computer points having piano type 1 No 6 pin 16 amp socket outlet, 1 No 16 amp switch and 3 Nos 3 pin 6 amp socket outlets, 3 Nos 6 amp switches, suitable M.S box, 3mm thick phenolic laminated sheet cover including painting etc. as per specification.	Each	458.00
5.3	Providing and fixing composite board for computer points having piano type 1 No 6 pin 16 amp socket outlet, 1 No 16 amp switch and 3 Nos 3 pin 6 amp socket outlets, 3 Nos 6 amp switches, suitable size wooden box, 3mm thick phenolic laminated sheet cover including painting etc. as per specification.	Each	296.00

Code No.	Description	Unit	Rate Rs.
5.4	Supplying and fixing following modular switch, socket, other accessories on the existing modular plate & switch box including connections but excluding modular plate etc. as per specification.		
5.4.1	5/6 amps one way switch	Each	59.00
5.4.2	5/6 amps two way switch	Each	72.00
5.4.3	Bell push	Each	68.00
5.4.4	15/16 amp switch	Each	76.00
5.4.5	3 pin 5/6 amp socket outlet	Each	82.00
5.4.6	6 pin 15/16 amp socket outlet	Each	102.00
5.4.7	6 pin 20 amp socket outlet	Each	122.00
5.4.8	Fan regulator (one module size) electronic stepped type moving all rounds	Each	158.00
5.4.9	Fan regulator (two module size) electronic stepped type moving all rounds	Each	190.00
5.4.10	Plug Top (Deluxe type) 3 pin 5/6 Amps (For light plug).	Each	61.00
5.4.11	Plug Top (Deluxe type) 3 pin 16 Amps (For power plug).	Each	72.00
5.4.12	Plug Top (Deluxe type) 3 pin 25 Amps (For power plug).	Each	63.00
5.4.13	RJ-45 {CAT6} socket outlet	Each	224.00
5.4.14	RJ-45 {CAT6} LAN, I/O Box	Each	169.00
5.4.15	Telephone socket outlet	Each	60.00
5.4.16	T.V. antenna socket outlet	Each	63.00
5.4.17	Computer Outlet Jack	Each	206.00
5.4.18	25/32 amp A.C. Starter switch	Each	209.00
5.4.19	SP MCB 25 amp	Each	213.00
5.4.20	Ceiling rose 3 pin 5/6 amp	Each	34.00
5.4.21	Pendent holder	Each	40.00
5.4.22	Batten/ angle holder	Each	35.00
5.4.23	Blanking plate	Each	24.00
5.4.24	Key Tag Switch 20 amp with face and grid plate	Each	232.00
5.4.25	Key Tag Switch 32 amp with face and grid plate	Each	323.00
5.4.26	Key Holder/Tag for key tag	Each	44.00
5.4.27	USB charger socket 1 A	Each	290.00
5.4.28	USB charger socket 2.1 A	Each	378.00
5.5	Providing and fixing 16/32 amp DP surface switch with neon on suitable size wooden box including connection, testing etc. complete.	Each	129.00
5.6	Providing and fixing composite unit for computer points having modular type 1 No 6 pin 16 amp socket outlet, 1 No 16 amp switch, 3 Nos 3 pin 6 amp socket outlets, 3 Nos 6 amp switches, suitable G.I. box, base and cover plates, earthing the sockets and switch box including etc. as per specification.	Each	694.00
5.7	Supplying and fixing call bell/ buzzer suitable for single phase, 230 volts A.C. supply, complete as per specification.		
5.7.1	Ordinary (simple)	Each	63.00

Code No.	Description	Unit	Rate Rs.
5.7.2	Deluxe	Each	91.00
5.8	Providing and fixing following size FRLS PVC insulated, PVC sheathed, flexible copper conductor wire on the floor/ wall, or side of the table/ door etc. as per specification.		
5.8.1	0.5 sq. mm two core	Metre	18.00
5.8.2	1.0 sq. mm two core	Metre	23.00
5.8.3	1.0 sq. mm three core	Metre	29.00
5.9	Providing and fixing round/ hexagonal fan box (125mm dia) depth 75mm (max.) with 12mm dia steel bar hook, 1.6mm thick MS sheet cover, in RCC slab etc. as per specification.	Each	36.00
5.10	Providing and fixing fan hook made of 12mm dia steel bar in existing ceiling slab including cutting of roof, fixing hook above reinforcement on both side, repairing with cement mortar 1:2 (1 cement : 2 sand) etc. as per specification.	Each	93.00
5.11	Providing and fixing fan clamp made of 3mm thick MS flat on existing iron trusses/ girder including necessary bolts and nuts etc. as per specification.	Each	34.00

CHAPTER 6 - FANS, LUMINARIES AND LAMPS

(A) MATERIALS:

All Fans{as per IS code 374(2019)}, exhaust fans, fresh air fans, Luminaries and lamps, for which ISI certification is there, shall be of approved make and ISI marked only. All other accessories, for which ISI certification has not been issued, shall be of reputed and approved make.

(B) MEASUREMENT: Items of work shall be measured by counting in numbers.

The installation of fan/ fitting where working height from floor level is more than 4 metres, item no 6.49 shall be payable extra for such each every fan/fitting to compensate extra effort and extra labour involved.

(C) RATE: Cost of all material, labour and machinery used in execution of work of shall be in the cost of item.

Optimum Size/Number of Fans for Rooms of Different Sizes.

Room Width	Room Length										
	4m	5m	6m	7m	8m	9m	10m	11m	12m	14m	16m
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
3	1200/1	1400/1	1500/1	1050/2	1200/2	1400/2	1400/2	1400/2	1200/3	1400/3	1400/3
4	1200/1	1400/1	1200/2	1200/2	1200/2	1400/2	1400/2	1500/2	1200/3	1400/3	1500/3
5	1400/1	1400/1	1400/2	1400/2	1400/2	1400/2	1400/2	1500/2	1400/3	1400/3	1500/3
6	1200/2	1400/2	900/4	1050/4	1200/4	1400/4	1400/4	1500/4	1200/6	1400/6	1500/6
7	1200/2	1400/2	1050/4	1050/4	1200/4	1400/4	1400/4	1500/4	1200/6	1400/6	1500/6
8	1200/2	1400/2	1200/4	1200/4	1200/4	1400/4	1400/4	1500/4	1200/6	1400/6	1500/6
9	1400/2	1400/2	1400/4	1400/4	1400/4	1400/4	1400/4	1500/4	1400/6	1400/6	1500/6
10	1400/2	1400/2	1400/4	1400/4	1400/4	1400/4	1400/4	1500/4	1400/6	1400/6	1500/6
11	1500/2	1500/2	1500/4	1500/4	1500/4	1500/4	1500/4	1500/4	1500/6	1400/6	1500/6
12	1200/3	1400/3	1200/6	1200/6	1200/6	1400/6	1400/6	1500/6	1200/7	1400/9	1400/9
13	1400/3	1400/3	1200/6	1200/6	1200/6	1400/6	1400/6	1500/6	1400/9	1400/9	1500/9
14	1400/3	1400/3	1400/6	1400/6	1400/6	1400/6	1400/6	1500/6	1400/9	1400/9	1500/9

Note : This table is indicative as per CPWD specification only.

SPACE FUNCTION METHOD FOR INTERIOR LIGHTING DESIGN			
Space Function	LPD (W/m²)	Space Function	LPD (W/m²)
Office-enclosed	11.8	Workshop	20.5
Officece-open plan	11.8	Convention Centre - Exhibit Space	14.0
Conference/ Meeting/ Multipurpose	14.0	Library	
Classroom/Lecture/ Training	15.1	• For Card File & Cataloguing	11.8
Lobby	14.0	• For Stacks	18.3
• For Hotel	11.8	• For Reading Area	12.9
• For Performing Arts Theatre	35.5	Hospital	
• For Motion Picture Theatre	11.8	• For Emergency	29.1
Audience/ Seating Area	9.7	• For Recovery	8.6
• For Gymnasium	4.3	• For Nurse Station	10.8
• For Convention Centre	7.5	• For Exam Treatment	16.1
• For Religious Buildings	18.3	• For Pharmacy	12.9
• For Sports Arena	4.3	• For Patient Room	7.5
• For Performing Arts Theatre	28.0	• For Operating Room	23.7
• For Motion Picture Theatre	12.9	• For Nursery	6.5
• For Transportation	5.4	• For Medical Supply	15.1
Atrium-first three floors	6.5	• For Physical Therapy	9.7
Atrium-each additional floor	2.2	• For Radiology	4.3
Lounge/ Recreation	12.9	• For Laundry - Washing	6.5
• For Hospital	8.6	Automotive - Service Repair	7.5
Dining Area	9.7	Manufacturing Facility	
• For Hotel	14.0	• For Low Bay (<8m ceiling)	12.9
• For Motel	12.9	• For High Bay (>8m ceiling)	18.3
• For Bar Lounge/ Leisure Dining	15.1	• For Detailed Manufacturing	22.6
• For Family Dining	22.6	• For Equipment Room	12.9
• Food Preparation	12.9	• For Control Room	5.4
Laboratory	15.1	Hotel/ Motel Guest Rooms	11.8
Restrooms	9.7	Dormitory - Living Quarters	11.8
Dressing/ Lockers/ Fitting Room	6.5	Museum	
Corridor/ Transition	5.4	• For General Exhibition	10.8
• For Hospital	10.8	• For Restoration	18.3
• For Manufacturing facility	5.4	Bank Office - Banking Activity Area	16.1
Stairs-active	6.5	Retail	
Active Storage	8.6	• For Sales Area	18.3
• For Hospital	9.7	• For Mall Concourse	18.3
Inactive Storage	3.2	Sports Arena	
• For Museum	8.6	• For Rising Sports Area	29.1
Electrical/ Mechanical Facility	16.1	• For Court Sports Area	24.8

<i>Space Function</i>	<i>LPD (W/m²)</i>	<i>Space Function</i>	<i>LPD (W/m²)</i>
• For Indoor Field Area	15.1	Parking Garage - Garage Area	2.2
Warehouse		Transportation	
• For Fine Material Storage	15.1	• For Airport - Concourse	6.5
• For Medium/ Bulky Material		• For Air/ Train/ Bus-BaggageArea	10.8
Storage	9.7	• For Ticket Counter Terminal	16.1

Note: as per ECBC(energy conservation Building code) 2017

As Per Bureau of Energy Efficiency

Sr. No	Input Power (Watt)	Air Delivery (cmm)	System Efficiency (Service Value)	Size	Star Rating
1	50	210	4.2	1200 mm sweep	1
2	50	210	4.2	1200 mm sweep	1
3	55	224	4.07	1200 mm sweep	1
4	55	224	4.07	1200 mm sweep	1
5	50	220	4.4	1200 mm sweep	1
6	43	215	5	1200 mm sweep	3
7	55	224	4.07	1200 mm sweep	1
8	50	220	4.4	1200 mm sweep	1

Performance Value for Fans

S.No.	Fan Size mm	Minimum Air Delivery m ³ /min	Minimum Service Value m ³ /min/W
(1)	(2)	(3)	(4)
i)	900	130	3.1
ii)	1050	150	3.1
iii)	1200	210	4.0
iv)	1400	245	4.1
v)	1500	270	4.3

NOTE : Air delivery values are on the basis of air velocity measurement upto 15.m/min

Star Rating Plan

Based on the threshold values laid down under IS 374: 2019 including all amendments, as applicable, there shall be two separate star rating plans based on sweep sizes of ceiling fans.

For sweep size < 1200 mm (i.e. 900 mm and 1050 mm), the star rating plan would be:

Star Rating	Service value
1 Star	≥ 3.1 to < 3.6
2 Star	≥ 3.6 to < 4.1
3 Star	≥ 4.1 to < 4.6
4 Star	≥ 4.6 to < 5.1
5 Star	≥ 5.1

For sweep size ≥ 1200 mm (i.e. 1200 mm, 1400 mm and 1500 mm), the star rating plan would be:

Star Rating	Service value
1 Star	≥ 4.0 to < 4.5
2 Star	≥ 4.5 to < 5.0
3 Star	≥ 5.0 to < 5.5
4 Star	≥ 5.5 to < 6.0
5 Star	≥ 6.0

Note: In accordance with Table 1 (Performance values for fans) of IS 374: 2019 including all amendments, as applicable

For 1400 mm, minimum service value for fans shall be 4.1 (for 1 star)

For 1500 mm, minimum service value for fans shall be 4.3 (for 1 star)

CHAPTER 6 - FANS, LUMINARIES AND LAMPS

Code No.	Description	Unit	Rate Rs.
6.1	Supplying, installation, testing and commissioning of following sizes ceiling fan including wiring the down rods of standard length up to 30 cm with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable, earthing etc. complete as required. P.F. should be greater than 0.9, with BEE Star rating from 3 star and above, IS: 374:2019 including all amendments.		
6.1.1	600 mm sweep	Each	1255.00
6.1.2	1050 mm sweep	Each	1408.00
6.1.3	1200 mm sweep	Each	1442.00
6.1.4	1400 mm sweep	Each	1507.00
6.2	Supplying, installation, testing and commissioning of premium quality Decorative ceiling fan having modern designer blades, good airtthrow and with atleast two colour rendering effect along with unique smooth flowing canopies and down rod sleeve covering, wider blades at tips giving conical air throw including remote control for following sizes ceiling fan including wiring the down rods of standard length up to 30 cm with 1.5 sq. mm FRLS PVC insulated , copper conductor, single core wire, earthing etc. complete as per specification. P.F. should be greater than 0.9, with BEE Star rating from 3 star and above, IS: 374:2019 including all amendments		
6.2.1	900 mm sweep	Each	1603.00
6.2.2	1200 mm sweep	Each	1778.00
6.3	Supplying, installation, testing and commissioning of following sizes Pedestal fan with telescopic arrangement for height adjustment and standard wiring/connection etc complete as per specification. P.F. should be greater than 0.9		
6.3.1	400 mm sweep	Each	2032.00
6.3.2	450 mm sweep	Each	2108.00
6.3.3	500 mm sweep	Each	2527.00
6.4	Supply, Installation, Testing and Commissioning of 1200 mm sweep, BEE 5 star rated, ceiling fan with Brush Less Direct Current (BLDC) Motor, class of insulation: B, 3 nos. blades, 30 cm long down rod, 2 nos. canopies, shackle kit, safety rope, copper winding, Power Factor not less than 0.9, Service Value (CMM/W) minimum 6.85, Air delivery minimum 215 CMM, 350 RPM (tolerance as per IS : 374-2019), THD less than 10%, remote or electronic regulator unit for speed control and all remaining accessories including safety pin, nut bolts, washers, temperature rise=75 degree C (max.), insulation resistance more than 2 mega ohm, suitable for 230 V, 50 Hz, single phase AC Supply, including	Each	2263.00

Code No.	Description	Unit	Rate Rs.
	connection, earthing etc. complete as per specification.		
6.5	Supplying and fixing of wall/ cabin fan including connection etc. as per specification. P.F. should be greater than 0.9		
6.5.1	300 mm sweep	Each	1179.00
6.5.2	400 mm sweep	Each	1737.00
6.6	Supplying, installation, testing and commissioning of following sizes heavy duty (continuous running) 1400 rpm exhaust fan in existing opening in wall including earthing etc. complete as per specification. P.F. should be greater than 0.9		
6.6.1	300 mm sweep	Each	2079.00
6.6.2	380 mm sweep	Each	2429.00
6.6.3	450 mm sweep	Each	3380.00
6.7	Supplying, installation, testing and commissioning of 250/ 300 mm sweep 1400 rpm medium duty (continuous running) exhaust fan in existing opening in wall including earthing etc. complete as per specification. P.F. should be greater than 0.9	Each	1134.00
6.8	Supplying, installation, testing and commissioning of following sizes fancy exhaust fan having built in louvers in existing opening in wall including earthing etc. complete as per specification. P.F. should be greater than 0.9		
6.8.1	225 mm sweep	Each	987.00
6.8.2	300 mm sweep	Each	1080.00
6.9	Supplying, installation, testing and commissioning of following sizes Pedestal fan {Inverter Type: with builtin battery backup} with telescopic arrangement for height adjustment and standard wiring/connection etc complete as per specification. P.F. should be greater than 0.9		
6.9.1	400 mm sweep	Each	2386.00
6.10	Supplying and fixing of wall/ cabin fan {Inverter Type: with builtin battery backup} including connection etc. as per specification. P.F. should be greater than 0.9		
6.10.1	400 mm sweep	Each	2212.00
6.11	Supplying and fixing following sizes of down rod of 15/20mm dia M.S. pipe of thickness 2 mm to ceiling fan including painting with matching colour etc. as per specification.		
6.11.1	45 cm long	Each	26.00
6.11.2	60 cm long	Each	34.00
6.11.3	90 cm long	Each	49.00
6.11.4	120 cm long	Each	85.00
6.11.5	300 cm long	Each	119.00

Code No.	Description	Unit	Rate Rs.
6.12	Providing and fixing phenolic laminated sheet cover of 180 mm dia 3 mm thick on the fan box etc. as per specification. (If provided at the time of installation of ceiling fan)	Each	48.00
6.13	Supplying and fixing of resistance type ceiling fan regulator, in/ on existing switch box including connection, earthing etc. as per specification.	Each	82.00
6.14	Supplying, fixing, testing and commissioning of following 230/250 volts fluorescent lamp (tube) in existing lighting luminaries as per specification. P.F. should be greater than 0.9		
6.14.1	4' x 36/40 watt	Each	43.00
6.15	Supplying, installation, testing and commissioning of following LED fitting (luminaries) panel light in round/ square shape complete with electronic driver heat sink capacitor and all other accessories on surface/ in false ceiling etc. as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		
6.15.1	3 Watt	Each	320.00
6.15.2	6 Watt	Each	417.00
6.15.3	9 Watt	Each	449.00
6.15.4	12 Watt	Each	500.00
6.15.5	15/16 Watt	Each	577.00
6.15.6	18/20 Watt	Each	738.00
6.16	Supplying, installation, testing and commissioning of following sleek LED panel down lighters (luminaries) in round/ square shape complete with electronic driver heat sink capacitor and all other accessories on surface/ in false ceiling etc. as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		
6.16.1	24 watt, size 300 x 300mm	Each	1509.00
6.16.2	36 watt, size 600 x 600mm	Each	1991.00
6.16.3	45 watt, size 1200 x 300mm	Each	2343.00
6.17	Supplying, fixing, testing and commissioning of following LED lamps with inbuilt electronic driver heat sink and all other accessories in existing holder/ luminaries as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		
6.17.1	3 watt	Each	73.00
6.17.2	5 Watt	Each	95.00
6.17.3	7 Watt	Each	105.00
6.17.4	9 Watt	Each	122.00
6.17.5	12 Watt	Each	183.00
6.17.6	15 Watt	Each	212.00
6.17.7	18/20 Watt (LED Rod)	Each	226.00

Code No.	Description	Unit	Rate Rs.
6.18	Supplying, installation, testing and commissioning of following COB LED Spot Light fitting complete with Electronic Driver Heat sink Capacitor and all other accessories including connection, earthing etc complete as per specification and IP20, P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		
6.18.1	6 watt	Each	719.00
6.18.2	9 watt	Each	976.00
6.18.3	20 watt	Each	1073.00
6.18.4	30 watt	Each	2357.00
6.18.5	40 watt	Each	2421.00
6.18.6	50 watt	Each	2807.00
6.19	Supplying, installation, testing and commissioning of following LED tube light fitting including batten with Electronic Driver Heat sink Capacitor complete with all other accessories on surface/ in false ceiling, including connection, earthing etc complete as per specification and IP20, P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		
6.19.1	5 watt {2 feet}	Each	218.00
6.19.2	10 watt {2 feet}	Each	298.00
6.19.3	18/20 watt {4 feet}	Each	377.00
6.19.4	36 watt {4 feet}	Each	610.00
6.20	Supplying, fixing, testing and commissioning of following LED lamps {Inverter Type: with builtin battery backup} with inbuilt electronic driver heat sink and all other accessories in existing holder/ luminaries as per specification and P.F. should be greater than 0.9.LED chip efficacy ratio ≥ 100 lumens /watt.		
6.20.1	9 Watt	Each	240.00
6.20.2	12 Watt	Each	464.00
6.21	Supplying, installation, testing and commissioning of following LED tube light fitting {Inverter Type: with builtin battery backup} including batten with Electronic Driver Heat sink Capacitor complete with all other accessories on surface/ in false ceiling, including connection, earthing etc complete as per specification. IP20, P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		
6.21.1	20 watt	Each	847.00
6.22	Supplying, installation, testing and commissioning of following 230/250 volts LED BOLLARD fitting cool white/warm white {Colour Temperature 3000/4000/5600/6000 K} with electronic driver, heat sink, capacitor and all other accessories on existing foundation/ pole bracket, including connection, earthing etc complete as per specification. P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt.		

Code No.	Description	Unit	Rate Rs.
6.22.1	9 watt	Each	3070.00
6.23	Supplying, installation, testing and commissioning of following 230/250 volts LED Post Top Lantern fitting with perplex cover/decorative diffuser, electronic ballast and all other accessories on existing gate column/ pole bracket, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9 . LED chip efficacy ratio ≥ 100 lumens /watt.		
6.23.1	25 Watt	Each	2283.00
6.23.2	40 Watt	Each	2794.00
6.23.3	45 Watt	Each	4831.00
6.23.4	65 Watt	Each	7914.00
6.23.5	70 Watt	Each	9197.00
6.24	Supplying, installation, testing and commissioning of following LED Spike Light fitting complete with Electronic Driver Heat sink Capacitor and all other accessories, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt. IP-65		
6.24.1	9 watt	Each	1352.00
6.25	Supplying, installation, testing and commissioning of following LED Strip Light fitting complete with Electronic Driver Heat sink Capacitor and all other accessories, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt. IP-65		
6.25.1	5 watt per metre LED Strip	Metre	247.00
6.25.2	15 watt per metre LED Strip	Metre	335.00
6.26	Supplying, installation, testing and commissioning of following LED Signage entry/exit having minimum size 300mm (L) x 200mm (H) x 45mm (W), fitting complete including built in battery backup for 2 hour with Electronic Driver Heat sink Capacitor and all other accessories, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt. IP-20		
6.26.1	Single sided LED Signage	Each	3311.00
6.26.2	Double sided LED Signage	Each	3932.00
6.27	Supplying, installation, testing and commissioning of following LED Bulk Head fitting complete with Electronic Driver Heat sink Capacitor and all other accessories, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt. IP65		
6.27.1	10 watt	Each	969.00

Code No.	Description	Unit	Rate Rs.
6.28	Supplying, installation, testing and commissioning of following 230/250 volts LED street light fitting with all accessories like driver, heat sink made of die cast aluminium with IP 66 protection and 15 KV surge protection on pole bracket, including connection, earthing, Separate housing for driver etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 120 lumens /watt.		
6.28.1	15 watt	Each	1008.00
6.28.2	20 watt	Each	1158.00
6.28.3	25 watt	Each	1308.00
6.28.4	30 watt	Each	1607.00
6.28.5	36 watt	Each	2005.00
6.28.6	45 watt	Each	2320.00
6.28.7	60 watt	Each	3079.00
6.28.8	90 watt	Each	4701.00
6.28.9	120 watt	Each	5817.00
6.28.10	135 watt	Each	6875.00
6.28.11	150 watt	Each	7945.00
6.28.12	180 watt	Each	9423.00
6.28.13	210 watt	Each	11948.00
6.28.14	250 watt	Each	13469.00
6.29	Supplying of following 230/250 volts LED Flood light fitting with all accessories like driver, heat sink made of die cast aluminium with IP 66 protection and 15 KV surge protection on pole bracket, including connection, earthing, Separate housing for driver etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 120 lumens /watt.		
6.29.1	30 watt	Each	1607.00
6.29.2	50 watt	Each	2427.00
6.29.3	60 watt	Each	3000.00
6.29.4	80 watt	Each	4419.00
6.29.5	100watt	Each	5345.00
6.29.6	120 watt	Each	6248.00
6.29.7	150 watt	Each	7945.00
6.29.8	180 watt	Each	9458.00
6.29.9	200 watt	Each	11382.00
6.29.10	250 watt	Each	13576.00
6.29.11	300 watt	Each	14641.00
6.29.12	350 watt	Each	16676.00
6.29.13	400 watt	Each	21990.00
6.29.14	500 watt	Each	29883.00

Code No.	Description	Unit	Rate Rs.
6.30	Supplying, installation, testing and commissioning of following surface/ concealed type fluorescent fitting (luminaries) complete with electronic ballast/ copper ballast glow type starter but without fluorescent lamp, on ceiling/ wall surface, earthing the fitting etc. as per specification. P.F. should be greater than 0.9		
6.30.1	4' x 40 W single patti type	Each	183.00
6.31	Supplying, fixing, testing and commissioning of following 230/250 volts metal halide lamp in existing lighting luminaries fixed on pole/ wall/ roof etc as per specification.		
6.31.1	70 watt (T)	Each	636.00
6.31.2	150 watt (T)	Each	708.00
6.31.3	250 watt (T)	Each	762.00
6.31.4	400 watt (BT)	Each	799.00
6.31.5	70 Watt (E)	Each	636.00
6.31.6	150 Watt (E)	Each	672.00
6.31.7	250 Watt (E)	Each	762.00
6.31.8	400 watt (E)	Each	799.00
6.31.9	70 Watt double ended	Each	454.00
6.31.10	150 watt double ended	Each	472.00
6.32	Supplying, fixing, testing and commissioning of following 230/250 volts HPSV lamp tubular/elliptical in existing lighting luminaries on pole/ wall/ roof etc as per specification. P.F. should be greater than 0.9		
6.32.1	70 watt (E)	Each	254.00
6.32.2	150 watt (E)	Each	363.00
6.32.3	250 watt (E)	Each	400.00
6.32.4	400 watt (E)	Each	472.00
6.32.5	70 Watt (T)	Each	254.00
6.32.6	150 Watt (T)	Each	372.00
6.32.7	250 Watt (T)	Each	409.00
6.32.8	400 Watt (T)	Each	481.00
6.32.9	70 Watt (T) plus	Each	186.00
6.32.10	150 Watt (T) plus	Each	196.00
6.32.11	250 Watt (T) plus	Each	327.00
6.32.12	400 Watt (T) plus	Each	404.00
6.33	Supplying, fixing, testing and commissioning of approved make following 230/250 volts electronic ballast in existing luminaries at all locations as per specification. P.F. should be greater than 0.9		
6.33.1	For 36/40 watt T8 flu. Fitting	Each	200.00
6.33.2	For 28 watt T5 flu. Fitting	Each	312.00
6.33.3	For 26 watt CFL Fitting	Each	440.00

Code No.	Description	Unit	Rate Rs.
6.33.4	For 36 watt CFL Fitting	Each	440.00
6.34	Supplying, fixing, testing and commissioning of glow type starter suitable for 36/40 watt T8 230/250 volts flu. lamp in existing luminaries at all locations as per specification.	Each	13.00
6.35	Supplying, fixing, testing and commissioning of approved make following 230/250 volts polyester filled copper wound ballast in existing luminaries at all locations as per specification. P.F. should be greater than 0.9		
6.35.1	For 36/40 watt T8 flu. Fitting.	Each	231.00
6.35.2	For 70 watt HPSV/ Metal halide fitting	Each	740.00
6.35.3	For 150 watt HPSV/ Metal halide fitting	Each	1073.00
6.35.4	For 250 watt HPSV/ Metal halide fitting	Each	1742.00
6.35.5	For 400 watt HPSV/ Metal halide fitting	Each	2395.00
6.36	Supplying, fixing, testing and commissioning of approved make following 230/250 volts electronic ballast in existing luminaries at all locations as per specification. P.F. should be greater than 0.9		
6.36.1	For 70 watt HPSV/ Metal halide fitting	Each	576.00
6.36.2	For 150 watt HPSV/ Metal halide fitting	Each	976.00
6.36.3	For 250 watt HPSV/ Metal halide fitting	Each	1179.00
6.36.4	For 400 watt HPSV/ Metal halide fitting	Each	1661.00
6.37	Supplying, fixing, testing and commissioning of following 230/250 volts igniters in existing luminaries at all locations as per specification. P.F. should be greater than 0.9		
6.37.1	For 70-400 watt integral luminaries	Each	277.00
6.37.2	For 70-400 watt non integral luminaries	Each	201.00
6.38	Supplying, fixing, testing and commissioning of following 230/250 volts capacitors in existing ceiling fans/ exhaust fan at all locations as per specification. P.F. should be greater than 0.9		
6.38.1	2.0 MFD	Each	94.00
6.38.2	2.5 MFD	Each	96.00
6.38.3	3.15 MFD	Each	97.00
6.38.4	4 MFD	Each	99.00
6.39	Supplying, fixing, testing and commissioning of following 230/250 volts capacitors for single phase motor at all locations as per specification. P.F. should be greater than 0.9		
6.39.1	6 MFD	Each	100.00
6.39.2	8 MFD	Each	103.00
6.39.3	10 MFD	Each	116.00
6.39.4	12 MFD	Each	121.00
6.39.5	15 MFD	Each	125.00
6.39.6	20 MFD	Each	137.00

Code No.	Description	Unit	Rate Rs.
6.39.7	25 MFD	Each	158.00
6.39.8	30 MFD	Each	166.00
6.40	Installation, testing and commissioning of ceiling fan, including wiring the down rods of standard length up to 30 cm with 1.5 sq. mm FRLS PVC insulated , copper conductor, single core wire, earthing etc. complete as per specification.	Each	60.00
6.41	Installation, testing and commissioning of wall/ cabin fan, etc. complete as per specification.	Each	38.00
6.42	Installation of following size exhaust fan in the existing opening including connection, testing, commissioning etc. as per specification.		
6.42.1	Upto 300 mm sweep	Each	111.00
6.42.2	380 mm sweep	Each	111.00
6.42.3	450 mm sweep	Each	168.00
6.43	Extra for fixing the louvers/ shutters complete with frame for exhaust fan of all sizes.	Each	76.00
6.44	Erection of all type of GLS lamps/ CFL/LED fitting on wall /ceiling of all sizes and all shapes complete with all accessories including connection etc. as per specification.	Each	38.00
6.45	Installation, testing and commissioning of pre-wired, fluorescent fitting / compact fluorescent fitting of all types, complete with all accessories and tube etc. including connection with 1.5 sq. mm FRLS PVC insulated , copper conductor, single core wire and earthing etc. as per specification.		
6.45.1	Directly on ceiling/ wall	Each	49.00
6.45.2	Hanging with 2 Nos ball and socket arrangement with 30cm long 1.6mm thick 20mm dia steel conduit down rod wiring in down rod with 3x1.5 Sqmm FRLS PVC insulated copper conductor wire.	Each	162.00
6.45.3	Hanging with 2 Nos metallic chain of suitable size and upto 60 cm length and wiring the with twin twisted FRLS PVC insulated copper conductor wire.	Each	123.00
6.46	Providing and fixing extra conduit down rod of 20 mm dia, 2 X 10 cm length wiring with 2 X 1.5 sq. mm FRLS PVC insulated , copper conductor wire including painting etc. as per specification. (Note : More than 5 cm length shall be rounded to the nearest 10 cm and 5 cm or less shall be ignored)	Each	31.00
6.47	Installation, testing and commissioning of all types of street light fittings with all accessories and lamps on street light bracket fixed on wall/ pole, including connection with FRLS PVC insulated , copper conductor, single core wire upto 2 metre length, earthing etc. as per specification.	Each	72.00
6.48	Numbering of ceiling fan/ exhaust fan/ fluorescent fittings as per specification.	Each	9.00

Code No.	Description	Unit	Rate Rs.
6.49	Extra cost for installing the ceiling fan/ exhaust fan/ fluorescent fittings beyond 4 metres height from floor level, for every 2 metres or part thereof.	Each	9.00
6.50	Providing and fixing wooden board of suitable size (18"x 24") for energy meter etc complete as per specification.	Each	105.00
SOLAR BLINKER/SIGNAL LIGHT			
6.51	Supplying, installation, testing and commissioning of 300mm dia. Polycarbonate lamp head assembly unit (blinker light) complete with visor prismatic lenses etc. complete as per specification operating on 230V AC. For RED / Amber LED Retrofit.	Each	1991.00
6.52	Supplying , installation , testing and commissioning of Blinker Controller	Each	1518.00
6.53	Supplying , installation , testing and commissioning of 300mm dia. Polycarbonate lamp head assembly unit (blinker light) complete with visor prismatic lenses etc. complete as per specification operating on solar power For RED / Amber LED Retrofit.	Each	1991.00
6.54	Supplying , installation , testing and commissioning of low maintenance tubular battery with necessary connectors, links terminals etc. 12Volts DC 18 AH	Each	1646.00
6.55	Supplying , installation , testing and commissioning of photovoltaic solar panels of 12 Volt 40 Watt as per the specifications	Each	2321.00
6.56	Supplying , installation , testing and commissioning of solar frame for panel with suitable angle iron required	Each	1518.00
6.57	Supplying , installation , testing and commissioning of Battery charger charging unit with battery overcharge protection, battery deep discharge protection, reverse polarity protection, etc. complete	Each	522.00
LED GLOW SIGN BOARD			
6.58	Supplying, installation, testing and commissioning of Acrylic LED light (a) Specification of Acrylic 3 mm thick x 3 " width x 4 " depth *(imbose) (b) Specification of LED modules :- Each Moduel should have 6 Nos LED of 1 watt	SQFT	1965.00
6.59	Supplying and installation of timer including relay and contactor set complete as required.	Each	3340.00
6.60	Supplying and installation of SMPS (water proof) for power supply AC input 110/220 V 50/60HZ DC output 12V 30A	Each	4445.00
6.61	Fabrication and installation of angle iron including angle size 50 mm x 5 mm thick with labour charges including materials as per specification	KG	56.00
6.62	Providing and fixing aluminium composite panels in approved panel sizes, thickness and shape on aluminium frame work		

Code No.	Description	Unit	Rate Rs.
6.62.1	4 mm thick	SQM	2043.00
6.63	Designing providing and fixing aluminium frame work made of special aluminium section on building face with M.S. angle iron brackets fixed on RCC structure with S.S. hold fasteners, including providing and fixing two sided structural adhesive tape of appropriate grade on aluminium section for fixing aluminium/glass panel, sealing on perihphery of frame work by providing EPDM gasket, silicon weather sealant between aluminium frame and building structure.	KG	463.00
6.64	Supplying, fixing, testing and commissioning of following LED batten fitting (patti) but without LED lamp on ceiling/wall surface etc as per specification.		0.00
6.64.1	1x18W	Each	126.00
6.64.2	2x20W	Each	154.00
6.65	Supplying, Installation, testing and commissioning of following type LED Driver for LED Panel/down lights by approved make as required.		0.00
6.65.1	3-6 watt	Each	107.00
6.65.2	9-12 watt	Each	131.00
6.65.3	15 watt	Each	148.00
6.65.4	18/20 watt	Each	165.00
6.65.5	36/40 watt	Each	327.00
6.66	Supplying, Installation, testing and commissioning of following type LED Driver for COB lights by approved make as required.		
6.66.1	6-15 watt	Each	368.00
6.66.2	18/20 watt	Each	383.00
6.66.3	30 watt	Each	496.00
6.66.4	40 watt	Each	531.00
6.66.5	50 watt	Each	621.00
6.67	Supplying, installation, testing and commissioning of following RGBW LED Flood Light fitting (luminaries) IP 66 Rating, complete with electronic driver heat sink capacitor and all other accessories etc. as per specification.	`	0.00
6.67.1	60 watt	Each	8054.00
6.67.2	120 watt	Each	14669.00
6.67.3	180 watt	Each	21285.00
6.67.4	240 watt	Each	27901.00
6.67.5	360 watt	Each	41132.00
6.67.6	480 watt	Each	54364.00
6.68	Supplying, Installation, testing and commissioning of following type LED Driver for LED Street lights / Flood Lights, IP 65 by approved make as required.		

Code No.	Description	Unit	Rate Rs.
6.68.1	10 watt	Each	298.00
6.68.2	24 watt	Each	366.00
6.68.3	36 watt	Each	432.00
6.68.4	50 watt	Each	521.00
	LED DOWN LIGHTER		
6.69	Supplying, installation, testing and commissioning of following LED fitting (luminaries) down lighters in round/ square shape shall be made up of Die Cast Powder coated housing complete with electronic driver ,heat sink and all other accessories on surface/ in false ceiling etc. as per specification. P.F. should be greater than 0.9 LED chip efficacy ratio $\geq$ 100 lumens /watt and Total harmonic distortion (THD) of less than 10%.		
6.69.1	6 Watt	Each	1348.00
6.69.2	9 Watt	Each	1412.00
6.69.3	12 Watt	Each	1605.00
6.69.4	18/20 Watt	Each	1888.00
6.69.5	26/28 Watt	Each	3044.00
	DIMMABLE INDOOR LIGHTS		
6.70	Supplying, installation, testing and commissioning of following Dimmable LED Panel Light fitting complete with Electronic Driver, Heat sink and all other accessories including connection, earthing etc complete as per specification and IP20, P.F. should be greater than 0.9. LED chip efficacy ratio $\geq$ 100 lumens /watt.		
6.70.1	12 watt	Each	952.00
6.70.2	15 watt	Each	1073.00
6.70.3	18 watt	Each	1273.00
6.71	Supplying, installation , testing and commissioning of following recess mounted DALI/0-10volt Analogue dimmable LED/COB Downlighter with Die cast housing made of aluminum and white. Powder coated finish. Diming should be Based LED shall having LM80 complied as per L70 standard LEDs minimum tested for 10,000 burning hours with 3000-6000K CCT with minimum life cycle 50000 hrs burning hours at 50°C. Driver shall be 3 stage Constant Current Constant Voltage with voltage range of 150-270V AC. Driver Power factor shall be 0.95 and above and THD shall be less than 10%.		
6.71.1	12 watt	Each	1475.00
6.71.2	15 watt	Each	1586.00
6.71.3	18 watt	Each	1903.00
6.71.4	20 watt	Each	2845.00
6.71.5	30 watt	Each	3042.00
6.71.6	40 watt	Each	6746.00
6.71.7	50 watt	Each	7602.00

Code No.	Description	Unit	Rate Rs.
6.72	Supplying, Installation, testing and commissioning of following type LED Driver of Constant Current Constant Voltage with voltage range of 150-270V AC for Dimmable COB spot light and down lighter IP 22 by approved make as required.		
6.72.1	12 watt	Each	847.00
6.72.2	15 watt	Each	1032.00
6.72.3	18 watt	Each	1113.00
6.72.4	20 watt	Each	1176.00
6.72.5	30 watt	Each	1393.00
6.72.6	40 watt	Each	1514.00
6.72.7	50 watt	Each	1651.00
6.73	Supplying, Installation, testing and commissioning of following type LED Driver of Constant Current Constant Voltage with voltage range of 150-270V AC for Dimmable LED Panel Lights IP 22 by approved make as required.		
6.73.1	12 watt	Each	864.00
6.73.2	15 watt	Each	896.00
6.73.3	18watt	Each	1008.00
6.74	Supplying, Installation, testing and commissioning of Wi-Fi smart LED Dimming Switch with remote control having flicker free dimming range 10% to 100 % having rated current 6 Amp as per the Specification.	Each	19057.00
DIMMABLE OUTDOOR LIGHTS			
6.75	Supplying, installation, testing and commissioning for the following RF Based analogue (0-10v) dimmable LED Street Light fixture with IP66 protected Die-Cast Aluminum housing and Heat resistive Toughened Glass. LED shall having LM80 complied as per L70 standard LEDs minimum tested for 10,000 burning hours with 5700-6000K CCT with minimum life cycle 50000 hrs burning hours at 50°C. . Luminaire shall have RF node for communication thru CCMS. Optics shall be properly designed with Polycarbonate Lenses to avoid dark patches on the road. Street light without lenses will not be acceptable. Driver shall be 3 stage Constant Current Constant Voltage with voltage range of 150-270V AC. Output voltage of driver should be complied to Safety Extra Low Voltage norms not exceeding 60V DC. Driver Power factor shall be 0.95 and above and THD shall be less than 10%.		
6.75.1	45 watt	Each	4535.00
6.75.2	90 watt	Each	7168.00
6.75.3	120 watt	Each	8684.00
6.75.4	135 watt	Each	11590.00
6.75.5	150 watt	Each	12736.00

Code No.	Description	Unit	Rate Rs.
6.75.6	180 watt	Each	14705.00
6.75.7	210 watt	Each	18193.00
6.76	Supplying, Installation, testing and commissioning of following type LED Driver having Constant Current Constant Voltage with voltage range of 150-270V AC. for Dimmable LED Street lights / Flood Lights, IP 65 by approved make as required.		
6.76.1	50 watt	Each	960.00
	STEP LIGHT / PATHWAY LIGHT / SPOT LGHT / BOLLARD		
6.77	Supplying, installation , testing and commissioning of architectural LED recess round shape Spot light with housing material of frame of stainless trim, Cover material-tempered glass, system wattage not exceeding 6W and system lumen output of not less than 500 lumens with CCT 3000K, System efficacy $\geq 85\text{Lm/W}$. Fixture should be available with beam angles of min range 20°- 25°, Luminaire should be capable to operate at 100-240 VAC. min life of 50,000 hours ,with IP66 rating . Working temperature range 0°C to 40°C and working humidity level of Up to 95% RH .Fixture should equipped with mechanical impact of minimum IK10 including all accessories fitting support etc as required	Each	8626.00
6.78	Supplying, installation , testing and commissioning of LED Bollard luminaire with Die-cast, polycarbonate diffuser, wattage not exceeding 18W, system lumen output-900lumen, Luminaire should be capable of operating at line voltage without any separate power supply from 100-277 V AC. Luminaire is sealed to IP65 protection. Luminaire should Be Compact with option of no up-light ,Colour temperature of 6500K with CRI-70 including all accessories support fitting etc as required	Each	10573.00
6.79	Supplying , installation , testiing and commissioning of following type Recessed LED Step Lighting fixture with IP66/65 protected Die-Cast Aluminum housing and Heat resistive Toughened Glass. LED shall having LM80 complied as per L70 standard LEDs minimum tested for 10,000 burning hours with 3000K CCT with minimum life cycle 50000 hrs burning hours at 50°C. Luminaire LED should have secondary Optic lenses. Driver shall be 3 stage Constant Current Constant Voltage with voltage range of 150-270V AC. Output voltage of driver should be complied to Safety Extra Low Voltage norms not exceeding 60V DC. Driver Power factor shall be 0.95 and above and THD shall be less than 10%.		
6.79.1	3 watt	Each	1367.00
6.79.2	7 watt	Each	2437.00
6.80	Supplying , installation , testing and commissioning of following type Recessed LED inground/pathway Lighting fixture with IP67 protected		

Code No.	Description	Unit	Rate Rs.
	Die-Cast Aluminum housing and High purity Lenses for superior performance. LED shall having LM80 complied as per L70 standard LEDs minimum tested for 10,000 burning hours with 3000K CCT with minimum life cycle 50000 hrs burning hours at 50°C. Luminaire light should have secondary lenses. Driver shall be 3 stage Constant Current Constant Voltage with voltage range of 150-270V AC. Output voltage of driver should be complied to Safety Extra Low Voltage norms not exceeding 60V DC. Driver Power factor shall be 0.95 and above and THD shall be less than 10%.		
6.80.1	6 watt	Each	7008.00
6.80.2	12 watt	Each	11376.00
6.80.3	18 watt	Each	14695.00
	SOLAR STREET LIGHTS		
6.81	Supplying, Installation, testing and commissioning of hybrid solar street luminaire of housing made of extruded Aluminium and IP65 ingress protection. The all in one solar street lighting system having system lumen output up to 120 LPW (as per LM79 report of NABL accredited lab only), CCT of 6500k (+/- 500k) and CRI > 70, L70 should be of 50000 hours or more. The luminaire should be having SMD type LEDs with secondary lens / optics suitable for street lighting application, MPPT charge Controller and DC driver and automatic dusk to dawn operation feature. The All in one Solar Street light must have hybrid feature under which LED light can be operate by both AC mains & DC supply. The integrated luminaire should have monocrystalline PV module, Lithium battery pack having upto 10Hrs. of autonomy with full power mode and upto 36Hrs. of autonomy with saving mode. Specially designed in built PIR sensor allows to sense motion i.e. if a human is within sensor range then streetlight is at 100% full power lighting mode otherwise if no movement is detected to save energy it dims down to 30% of power.		
6.81.1	25w , 50Wp Monocrystalline Panel - 12.8V 22Ah Lithium Ferro Phosphate (LifePo4) battery	Each	33825.00
6.81.2	40w, 80Wp Monocrystalline Panel - 12.8V 35Ah Lithium Ferro Phosphate (LifePo4) battery	Each	41319.00
6.81.3	60w ,90Wp Monocrystalline Panel - 12.8V 52Ah Lithium Ferro Phosphate (LifePo4) battery	Each	58982.00
	UNDER WATER LIGHT		
6.82	Supplying, installation, testing and commissioning of following 24 volts AC Supply LED under water light fitting for fountain with stainless steel body with IP 68 protection including connection, earthing complete as per specification and P.F. should be greater than 0.9 (Excluding Driver)		

Code No.	Description	Unit	Rate Rs.
6.82.1	18 watt Warm White	Each	5448.00
6.82.2	24 watt Warm White	Each	6171.00
6.83	Supplying, installation, testing and commissioning of following 24 volts AC Supply LED under water light fitting for fountain with stainless steel body with IP 68 protection including connection, earthing complete as per specification and P.F. should be greater than 0.9 (Excluding Driver)		
6.83.1	18 watt RGB	Each	5970.00
6.83.2	24 watt RGB	Each	6612.00
6.84	Supplying, installation, testing and commissioning of following 24 volts AC Supply LED under water light fitting for fountain with stainless steel body with IP 68 protection including connection, earthing complete as per specification and P.F. should be greater than 0.9 (Excluding Driver)		
6.84.1	18 watt RGB DMX	Each	6652.00
6.84.2	24 watt RGB DMX	Each	8539.00
6.85	Supplying, installation, testing and commissioning of following 24 volts AC Supply LED under water light fitting for Swimming Pool with steel body with IP 68 protection including connection, earthing complete as per specification and P.F. should be greater than 0.9 (Excluding Driver)		
6.85.1	12 watt Warm White	Each	5568.00
6.85.2	24 watt Warm White	Each	8539.00
6.86	Supplying, installation, testing and commissioning of following 24 volts AC Supply LED under water light fitting for Swimming Pool with steel body with IP 68 protection including connection, earthing complete as per specification and P.F. should be greater than 0.9 (Excluding Driver)		
6.86.1	12 watt RGB	Each	6452.00
6.86.2	24 watt RGB	Each	9744.00
6.87	Supplying, Installation, testing and commissioning of following type LED Driver for under water LED Lights having output 24 Volt AC, IP 66 by approved make as required.		
6.87.1	30 watt	Each	1915.00
6.87.2	60 watt	Each	2437.00
6.87.3	100 watt	Each	3000.00
6.87.4	160 watt	Each	3641.00
6.87.5	200 watt	Each	4003.00
6.87.6	300 watt	Each	4605.00

Code No.	Description	Unit	Rate Rs.
SMART LIGHTING			
6.88	Supplying , installation , testing and commissioning for the following LED RGB / RGBW Linear wall washer luminaire for façade lighting with aluminium extruded housing of following wattage . Luminaire shall be capable of producing dynamic color changing light with 16 million colors by DMX / Ethernet based control . The beam angle of the fitting shall be narrow , medium , wide or asymmetric as per the requirement. Luminaire shall be complete with driver and capable of operating at line voltage without any seperate power supply from 100 to 270 V AC , 50 Hz , power factor >0.9 . Fixture shall be suitable to operate at ambient temperature range of -10 Degree C to +50 Degree C and shall be IP 65 and IK 06 rated . Lifetime should be at atleast L70:50000 burning hours at 50 Degree C . Luminaire shall be conforming to BIS and shall be complete with all necessary accessories required for proper working of fixture including weather proof connection cables , water proof connectors etc as required.		
6.88.1	20-25 watt	Each	18067.00
6.88.2	35-40 watt	Each	31421.00
6.88.3	45-50 Watt	Each	35168.00
6.88.4	55-60 Watt	Each	37309.00
6.88.5	65-70 Watt	Each	43465.00
6.88.6	80-100 Watt	Each	45606.00
6.89	Supplying, installation, testing and commissioning of Pulse with Module based water Proof controller for controlling RGB flood Light / Wall washer with remote control IP 65 as per the speciifcation.	Each	9744.00
6.90	Supplying, installation, testing and commissioning for the following LED RGB / RGBW flood lighting luminaire for façade lighting with Die-cast aluminium housing , power-coated finish of following wattage . Luminare shall be capable by DMX / Ethernet based control . The beam angle of the fitting shall be narrow , medium , wide , or asymmetric as per the requirement . Luminaire shall be complete with driver and capable of operating at line voltage without ant saperate power supply from 100-270 V AC , 50 HZ with power factor > 0.9 . Fixture shall be suitable to operate at an ambient temperature range of 10°C to +50°Cand shall be IP rated . Lifetime shall be atleast L70:50000 burning hours at 50°C. Luminare shall be conforming to BIS (IS 10322) and shall be complete with all necessary accessories required for proper working of fixture including weather proof connection cables , water proof connectors et as		

Code No.	Description	Unit	Rate Rs.
	required.		
6.90.1	55-60 watt	Each	34901.00
6.90.2	80- 85 watt	Each	40253.00
6.90.3	115- 120 watt	Each	45606.00
6.90.4	150- 180 watt	Each	58987.00
6.90.5	240- 300 watt	Each	107160.00
6.90.6	580-600 watt	Each	240975.00
6.91	Supplying, installation, testing and commissioning of LED Neon Flex Strip 220 V AC White /Warm White /Red /Blue /Pink / Yellow Coloured complete as per specification and IP65, P.F. should be greater than 0.75	Metre	271.00
6.92	Supplying, installation, testing and commissioning of individually addressable LED Neon Flex Strip 220 V AC RGBW Coloured complete as per specification and IP65, P.F. should be greater than 0.75	Metre	1434.00
6.93	Supplying, installation, testing and commissioning of following LED Rope light complete as per specification and IP65, P.F. should be greater than 0.75		
6.93.1	9 Watt per Metre White / Warm White	Metre	234.00
6.93.2	9 Watt per Metre RGB	Metre	302.00
6.94	Supplying, installation, testing and commissioning of following LED Strip Light fitting complete with Electronic Driver, Heat sink and all other accessories, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt. IP-65		
6.94.1	7 Watt per Metre White /Warm White /Red /Blue /Pink / Yellow/Green Coloured	Metre	349.00
6.94.2	14 Watt per Metre White /Warm White /Red /Blue /Pink / Yellow/Green Coloured	Metre	462.00
6.95	Supplying, installation, testing and commissioning of following LED Strip Light fitting complete with Electronic Driver Heat sink Capacitor and all other accessories, including connection, earthing etc complete as per specification and P.F. should be greater than 0.9. LED chip efficacy ratio ≥ 100 lumens /watt. IP-65		
6.95.1	7 Watt per Metre RGB Coloured	Metre	386.00
6.95.2	14 Watt per Metre RGB Coloured	Metre	615.00
6.96	Supplying, installation, testing and commissioning of amplifier Maximum 24 Amp for strip light IP 20 as per the specifications	Each	1153.00
6.97	Supplying, installation, testing and commissioning of Radio Frequency based RGB Strip Controller with remote control IP 20 as per the specifications	Each	1313.00
6.98	Supplying, installation, testing and commissioning of water proof Radio	Each	1554.00

Code No.	Description	Unit	Rate Rs.
	Frequency based RGB Controller for rope light with remote control IP 65 as per the specifications		
6.99	Supplying, Installation, Testing & Commissioning of Aluminium Profile for for Lighting (including aluminium profile and acrylic cover excluding led strip light) having following sizes (WXH) :		
6.99.1	9X9 mm Outer Dimensions	Metre	173.00
6.99.2	10X 13 mm Outer Dimensions	Metre	193.00
6.99.3	17X7 mm Outer Dimensions	Metre	202.00
6.99.4	24X28 mm Outer Dimensions	Metre	424.00
6.99.5	35X25 mm Outer Dimensions	Metre	494.00
6.99.6	49X32 mm Outer Dimensions	Metre	876.00
6.99.6	62X62 mm Outer Dimensions	Metre	1679.00
6.99.7	75X35 mm Outer Dimensions	Metre	1759.00
6.99.8	100X55 mm Outer Dimensions	Metre	2425.00
6.100	Supplying , installation , testing and commissioning of RGBW Tube exterior rated 4 ft.LED Direct View Ethernet controlled compact linear direct view luminaire with dynamic media & graphic effects , RGB, Designed for media graphics with a resolution up to 150 mm Pitch,Body of fittings- UV-stabilized Extruded polycarbonate,System Wattage(for 4ft luminaire) at maximum output, steady state in range of 12- 15W,Lumens Output more then 300 lumens,Lens -Translucent plastic suitable for direct viewing;Viewing angle range - 150° to 180° x 90° to 120° ; life of 50000 hours with IP66 rating and IK07 protection including all accessories fitting support etc as required.	Each	37398.00
6.101	Supplying , installation , Testing and Commissioning of 3000K architectural LED flood light with housing material of Die-cast aluminium, dark grey powder-coated finish, system wattage not exceeding 70W and system lumen output of not less than 5000 lumens,Color temperature should be 3000K with CRI=80.Fixture should be available with architectural optics with range of beam angles of Narrow 8°-12°, Medium 15°-20° and Wide 35°-40°.Fixture should operate in a temperature range of 0°C to 40°C. Fixture should have input voltage for 220 – 240 VAC. Lifetime should be at least 50,000 burning hours at L70 ,with total IP66 protection. Fixture should equipped with mechanical impact of minimum IK06 including all accessories support etc as required as per the specifications	Each	74236.00

Code No.	Description	Unit	Rate Rs.
SENSORS AND SMART PANEL			
6.102	Supplying, installation, testing and commissioning of Two way Programmable, compact presence detector provides automatic control for lighting loads. The sensor has Advanced presence detection by passive infrared (PIR) technology along with Sensitivity level adjustments. The maximum area of detection is 7m at the height of 2.8m. The sensor has Adjustable off delay timing 10 sec– 99 min which can be programmed & changed using a IR programming device. The sensor has inbuilt IR receiver to be used in conjunction with IR Remote Control for manual override. Device shall be able to control Non regulated ballast used with Lighting Load of 10 amps.	Each	2262.00
6.103	Supplying, installation, testing and commissioning of Day/Night sensor 220 - 240 volt AC for lighting purpose of IP 65 wattage rating upto 100 Watts as per the specification	Each	474.00
6.104	Supplying , installation ,testing and commissioning of splitter and booster ,should be able to provide multiple output DMX/RDM splitter with DMX/RDM pass-through supporting bi-directional communications for discovery, addressing and DMX control of Ethernet/DMX . The output terminals should be electronically isolated from the input & RDM-through port and share a common ground reference. All six output ports should have an independent output driver to boost the DMX/RDM signal ,it should be with surface or DIN-rail mountable,Isolated DMX/RDM Input/Outputs,Automatic switching between DMX and RDM mode for auto-discovery including all accessories support etc as required with water proof M.S. Sheet panel of suitable size.	Each	64587.00
6.105	SITC of Multi Protocol converter,of protocol conversions, including Ethernet lighting protocol to DMX512,DMX512 to Ethernet and RS232 to Ethernet suitable for Wall-mounted ,convert DMX-based power / data supplies with any Ethernet-based device protocol converter works with the PoE-compliant switch or PoE injector Protocol Converter standard RJ45 connectors to connect to both DMX-based power/data supplies from Ethernet/DMX and PoE-compliant switches Ultra-compact design-Protocol Converter compatible with other PoE-compliant devices including all accessories support etc as required. with water proof M.S. Sheet panel of suitable size.	Each	33740.00
6.106	Supplying , installation ,testing and commissioning of Content Program Controller with features of Single DMX ports control minimum 300 light addresses,Works as a stand-alone or computer-driven controller,Secure Digital (SD) card drive,USB 2.0 interface Flexible and adaptable	Each	100893.00

Code No.	Description	Unit	Rate Rs.
	mounting options should be provided with light show authoring software, Direct line voltage power supports 100 —240VAC, minimum Five pre configurable effects, using light authoring software to select from five pre defined effects, adjust effect settings such as color, speed, and brightness including all accessories support etc as required. with water proof M.S. Sheet panel of suitable size.		
6.107	Supplying , installation , testing and commissioing of 4 Channel Ballast Controller (16A load of each channel). O – 10 V, IP30 - 4 Channel Ballast Controller (Dimming Module) Having High Inrush Relays (SPNO) rated at 16 Amp per Channel. Power Consumption of Device is 85 VAC – 264 VAC. It is DIN Rail Mounted Device with Size of 160 MM X 90 MM X 58 MM. Device should Have 4 KV Isolation Between every Connector. Device Should Use DALI, SDIM and DMX for Communication. Ambient Temperature is 0 to 40 Deg C. Device has LED Segment Display with 2 No of Push Button for User interface. It Should Complies Safety Slanderred of EN 60950.	Each	44422.00
6.108	Supplying , installation , testing and commissioing of 8 Channel Relay unit (Switching module) With High Inrush Specification Rated at 16 Amp per Channel. Power Consumption of Device is 85 VAC – 264 VAC. It is DIN Rail Mounted Device with Size of Device should Have 4 KV Isolation Between every Connector. Device Should Use DALI, SDIM for Communication. Unit has LED Segment Display and Push Button for Monitoring and Manual Configuration or Controlling Purpose. Ambient Temperature is 0 to 40 Deg C. It Should Complies Safety Slanderred of EN 60950.	Each	46837.00
6.109	Supplying , installation , testing and commissioing of Power Supply unit, IP 30 - Power Supply Unit Capabale to Supply Up to 250 mAmp. Unit is DIN Rail Mouted Device With LED Indication for Power Connection. Device is Operate Between Supply of 85VAC – 264 VAC. Device Should Comprises of Short circuit / Over Voltage Protection. Device Have 3 KV Isolation .	Each	7399.00

Code No.	Description	Unit	Rate Rs.
6.110	Supplying , installation , testing and commissioing of DALI router 2Ch. IP 30 - Router Provides Local As Well As Central Control of DALI Network by Ethernet Connection and Form Lager Scalable System. Unit has operating Voltage of 100 VAC to 240 VAC. Unit Should Complies DALI Data transfer Standard IEC 62386. It Is A DIN Rail Mounting Device. Device Software Allows For Advance Configuration and Functional Programming of the Router. Device Provides Presence Detection and Daylight Harvesting. Unit Should Eliminate a Central Controller for no Single point Failure can cause a System Shutdown. Device Should Store Data within itself. Ambient Temp of Device is 0 to 40 Deg C.	Each	103681.00
6.111	Supplying , installation , testing and commissioing of Key Pad - IP 30 - 136 W - Moduler Panel for 7 Scenes + Off (8 buttons) Allows to control a Lighting System with Frame Kit Availble in Stainless Steel Option With Single Chassis. Each module Fitted with Indicator LEDs And Infared Receiver that Gives option of Remote Operation By Hand Held Remote.. Panels use a Data protocol Which Confirms to the DALI Protocols.	Each	26444.00
6.112	Supplying , installation , testing and commissioning of Control Module and power supply suitable for Direct view luminaires,with IP66 rating, it should have outdoor data supply with slim housing that takes 24V DC power and combines it with either Ethernet or DMX512 control data, , with fuse-protection, outputs ports. panel mount connectors, 24V DC SELV Input,Two combined power and data output ports die-cast aluminium housing and Should be supplied with suitable rating power supply including all accessories fittings support etc as required.with water proof M.S. Sheet panel of suitable size.	Each	41493.00

CHAPTER 7- METAL BOARD, BBC AND IC SWITCHES

(A) MATERIALS:

Metal Board

Metal board shall be fabricated true as per the approved drawings. If bigger size board than approved is fabricated and if it is accepted technically by the department then no payment for extra area of board will be payable.

BUS BAR CHAMBER

Bus bar chamber shall be made of 2.0 mm thick CRCA M.S. powder coated sheet. Appropriate size bus bars shall be provided in BBC. The minimum bus bar sizes for standard current rating are tabulated below.

Current ratings up-to amps	Recommended rectangular cross section of strip per phase in mm.	
	Aluminium (size in mm)	Copper (size in mm)
100	20x5	20x3
200	30x5	25x5
300	50x5	40x5
400	50x6	50x5
500	75x6	60x5
600	80x6	
800	100x6	
1000	100x10	
1200	125x10	
1600	2 nos 100x10	
2000	2 nos 125x10	
2500	3 nos 125x10	

For indoor applications, medium voltage and air insulated bus bars the minimum clearance shall be maintained as under.

Between	Min. Clearances
Phase to earth	26mm
Phase to phase	32mm

IC SWITCHES WITH REWIRABLE FUSES AND WITH HRC FUSES

All Iron clad SP&N/ TP&N Switches with Rewirable fuses/ HRC fuses, Rewirable porcelain Kit-Kat, HRC fuses, thimbles, lugs, wires/ cables shall be of approved make and ISI marked only

(B) MEASUREMENT:

Metal board /cubical panel shall be measured in length /breadth and heights in metre correct 1 cm and face area of front side only shall be calculated in Sqm correct to two points of decimal. Switches shall be counted in number. Height of legs in case of angle iron industrial board and channel base frame in case of cubical panel shall not be measured and shall not be paid in any form.

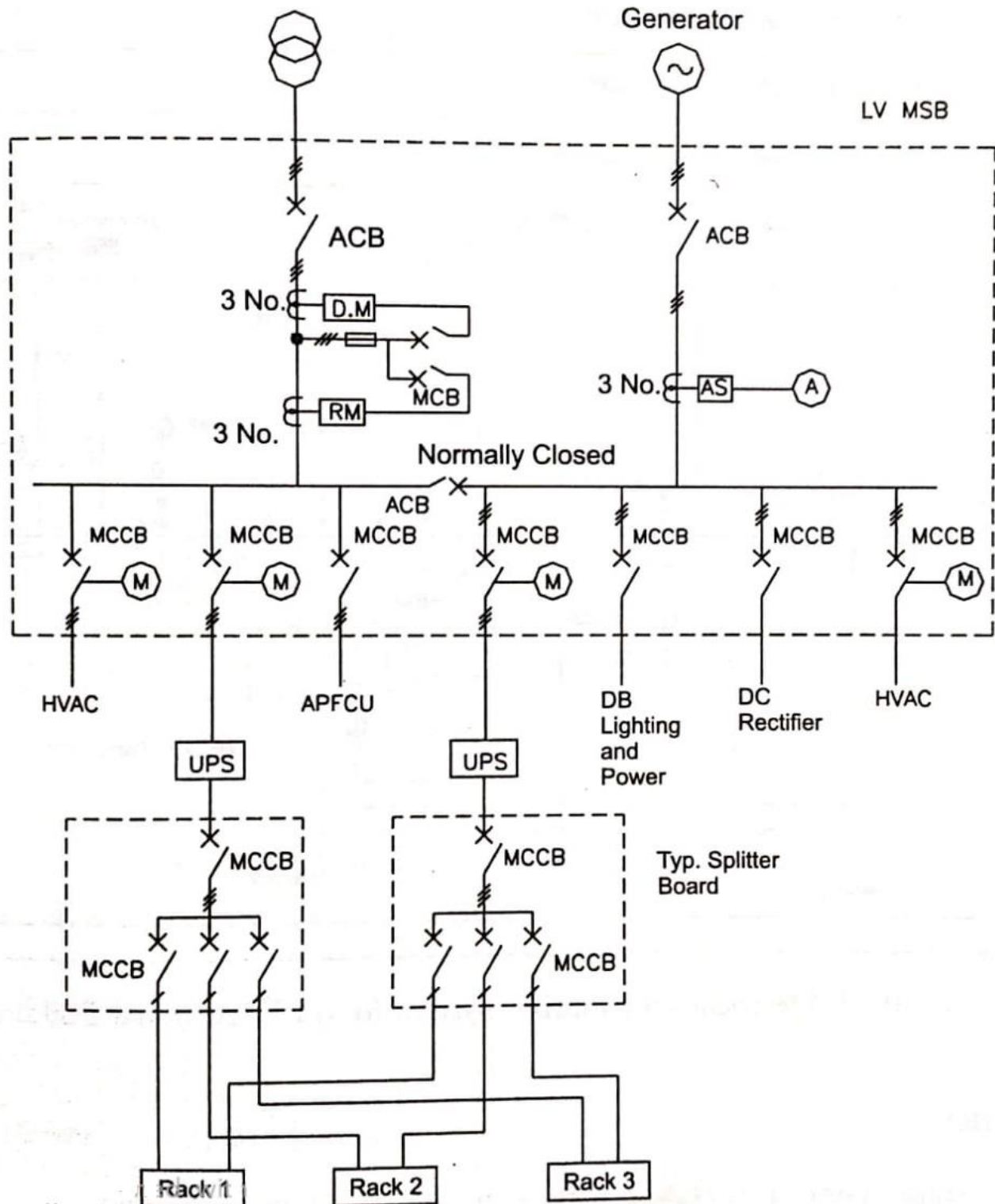
Items having unit "each" shall be counted and items like bus bars having unit "metre" shall be measured in linear basis in metres correct to 1 cm.

(C) RATE: Cost of all material, installation/fixing material, labour and machinery used in execution of work of shall be in the cost of item.

SLD of Electrical Panels for Double Feeder

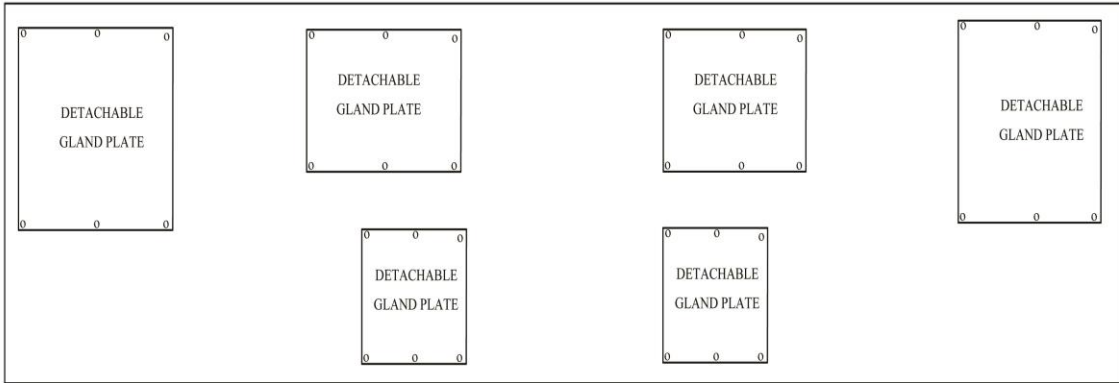
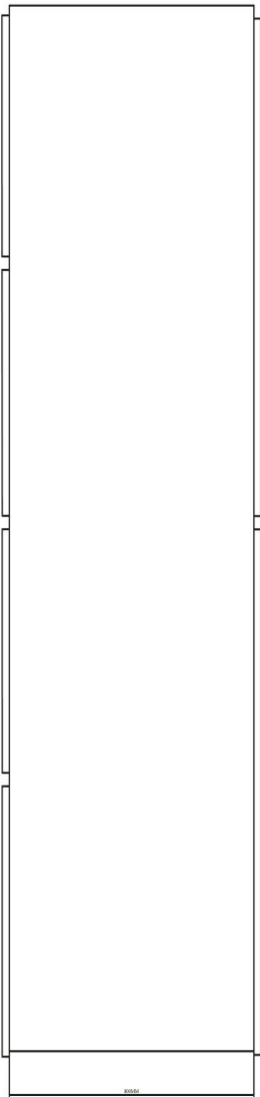
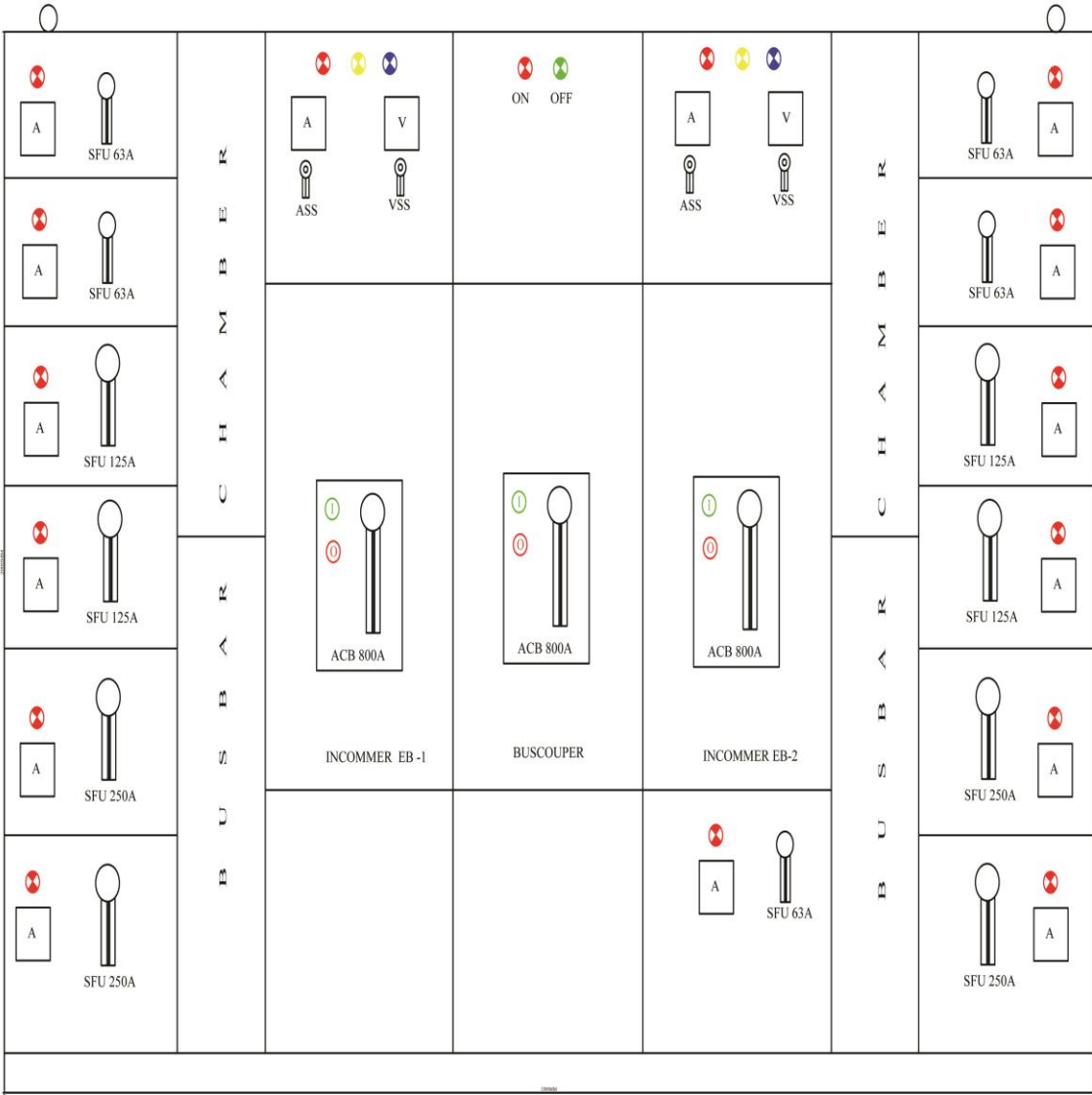
DM – Digital Meter

RM – Revenue Meter (if applicable)





GAD FOR TYPICAL CUBICAL PANEL



- NOTE -
1. BASE FRAME 3MM
 2. PANEL MADE BY 1.6MM CRCA SHEET
 3. PAINT POWDER COATED
 4. CABLE ENTRY BACK SIDE

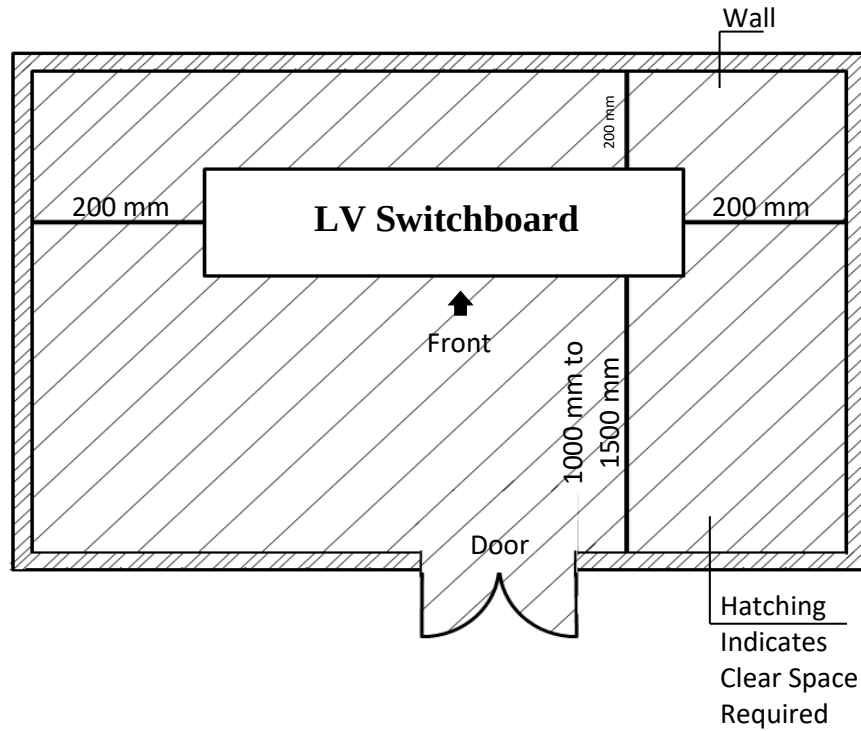
ACB CONSTRUCTION GUIDE LINES

ACB RATING	WIDTH OF COMPARTMENT (in mm)	WIDTH OF BUS COUPLER (in mm)	MAIN BUS BAR	MOUNTING ARRANGEMENT	INCOMING CONNECTION
800 A	700	800	1000 A	DOUBLE TIER (SINGLE TIER IF ACB IS INCOMER)	CABLE ENTRY /BUS DUCT AS SPECIFIED
1000 A	700	800	1250 A	DOUBLE TIER (SINGLE TIER IF ACB IS INCOMER)	CABLE ENTRY /BUS DUCT AS SPECIFIED
1250 A	700	800	1600 A	DOUBLE TIER (SINGLE TIER IF ACB IS INCOMER)	CABLE ENTRY /BUS DUCT AS SPECIFIED
1600 A	700	800	2000 A	SINGLE TIER	CABLE ENTRY /BUS DUCT AS SPECIFIED
2000 A	800	900	2500 A	SINGLE TIER	BUS DUCT ENTRY
2500 A	800	900	3000 A	SINGLE TIER	BUS DUCT ENTRY
3200 A	900	1000	4000 A	SINGLE TIER	BUS DUCT ENTRY
4000 A	1000	1100	5000 A	SINGLE TIER	BUS DUCT ENTRY

NO. OF MCCB'S ALLOWED IN A VERTICAL SWITCH BAY

MCCB RATING (IN A)	WIDTH OF COMPARTMENT (in mm)	NO. OF MCCB 'S ALLOWED IN A BAY	INCOMING CONNECTION FROM BUS BAR TO MCCB	CONNECTION FROM MCCB TO OUTGOING TERMINAL BLOCK
100-200 A MCCB	400	6	Al/ Cu wire or strip	Al/ Cu wire or insulated strip duly supported
ABOVE 200-400 A MCCB	500	5	Al/ Cu insulated strip	Al/ Cu wire or insulated strip duly supported
ABOVE 400-630 A MCCB	500	4	Al/ Cu insulated strip	Al/ Cu wire or insulated strip duly supported
800 A MCCB	600	2	Al/ Cu insulated strip	Al/ Cu wire or insulated strip duly supported
ABOVE 800 A MCCB	NOT TO BE USED, USE ACB IN CASE OF MORE THAN 800 A			

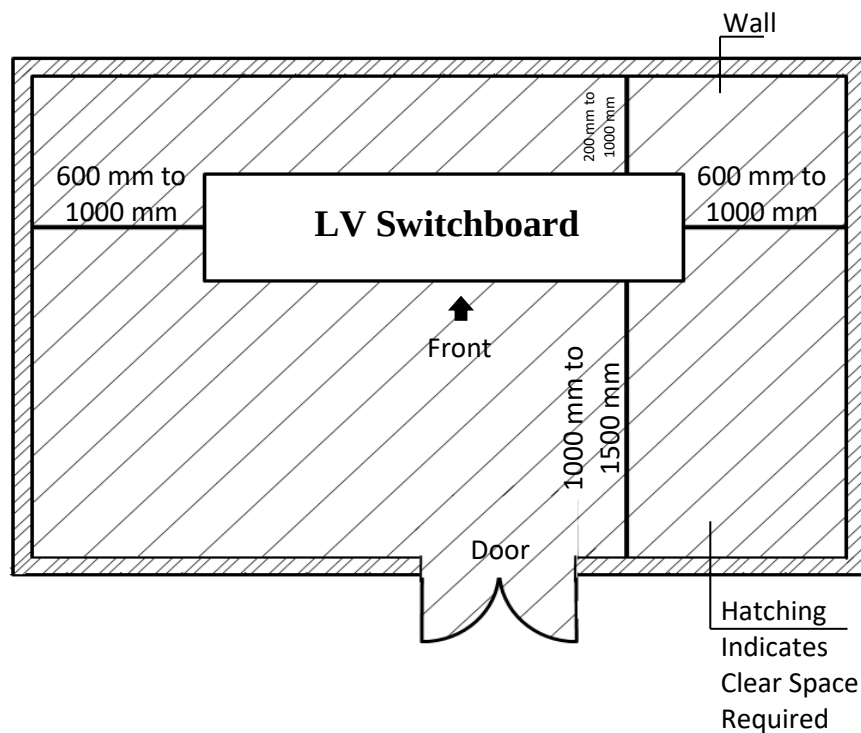
Plan of an LV Switch Board Panel With Front Access Only



For Fixed Type Board = 1000mm Clearance Required on Front

For Drawout Type Board = 1500mm Clearance Required on Front

Plan of an LV Switch Board Panel With Front & Rear Access



For Fixed Type Board = 1000mm Clearance Required on Front

For Drawout Type Board = 1500mm Clearance Required on Front

CHAPTER 7- METAL BOARD, BBC AND IC SWITCHES

Code No.	Description	Unit	Rate Rs.
7.1	Supplying and fixing wall/ floor mounted metal board of welded construction, fabricated with minimum 50mmX 50mm X 6mm angle iron frame work, with horizontal and vertical intermediate members of suitable angle/flat iron for mounting of switch gears including painting etc. as per specification.	Sqm	2571.00
7.2	Supplying and fixing wall mounted metal board of welded construction, fabricated with minimum 35 mm X 35 mm X 6 mm angle iron frame work, with 25 mm X 6 mm flat iron as intermediate members including painting etc. as per specification.	Sqm	2432.00
7.3	Supplying and fixing wall mounted metal board of welded construction, fabricated with minimum 25 mm X25 mm X 3 mm angle iron frame work, with 20 mm X 3 mm flat iron as intermediate members including painting etc. as per specification.	Sqm	1323.00
7.4	Supplying and fixing wall mounted metal board of welded construction, fabricated with minimum 25 mm X 4 mm flat iron frame work, and intermediate members of the same size including painting etc. as per specification.	Sqm	1247.00
7.5	Supplying and fixing metal clad busbar chamber made of 2.0 mm thick CRCA MS powder coated sheet with 2 strip aluminium alloy or wrought aluminium busbars of following capacity and length, complete with all accessories, including earthing the body etc. as per specification.		
7.5.1	100 amps x 300mm long	Each	770.00
7.5.2	100 amps x 450mm long	Each	1096.00
7.6	Supplying and fixing metal clad busbar chamber made of 2.0 mm thick CRCA MS powder coated sheet with 4 strip aluminium alloy or wrought aluminium busbars of following capacity and length, complete with all accessories, including earthing the body etc. as per specification.		
7.6.1	100 amps x 300mm long	Each	1096.00
7.6.2	100 amps x 450mm long	Each	1624.00
7.6.3	100 amps x 600mm long	Each	1930.00
7.6.4	200 amps x 300mm long	Each	1270.00
7.6.5	200 amps x 450mm long	Each	1861.00
7.6.6	200 amps x 600mm long	Each	2246.00
7.6.7	200 amps x 900mm long	Each	3002.00
7.6.8	300 amps x 450mm long	Each	2279.00
7.6.9	300 amps x 600mm long	Each	2785.00
7.6.10	300 amps x 900mm long	Each	3990.00
7.6.11	300 amps x 1200mm long	Each	4605.00

Code No.	Description	Unit	Rate Rs.
7.6.12	400 amps x 600mm long	Each	2938.00
7.6.13	400 amps x 900mm long	Each	4022.00
7.6.14	400 amps x 1200mm long	Each	4882.00
7.6.15	400 amps x 1500mm long	Each	5835.00
7.6.16	500 amps x 600mm long	Each	3709.00
7.6.17	500 amps x 900mm long	Each	5138.00
7.6.18	500 amps x 1200mm long	Each	6584.00
7.6.19	500 amps x 1500mm long	Each	8209.00
7.7	Supplying and fixing metal clad busbar chamber with 2 strip copper busbars of following capacity and length, complete with all accessories, including earthing the body etc. as per specification.		
7.7.1	100 amps x 300mm long	Each	949.00
7.7.2	100 amps x 450mm long	Each	1378.00
7.8	Supplying and fixing metal clad busbar chamber made of 2.0 mm thick CRCA MS powder coated sheet with 4 strip copper busbars of following capacity and length, complete with all accessories, including earthing the body etc. as per specification.		
7.8.1	100 amps x 300mm long	Each	1470.00
7.8.2	100 amps x 450mm long	Each	2169.00
7.8.3	100 amps x 600mm long	Each	2663.00
7.8.4	200 amps x 300mm long	Each	2140.00
7.8.5	200 amps x 450mm long	Each	3148.00
7.8.6	200 amps x 600mm long	Each	3967.00
7.8.7	200 amps x 900mm long	Each	5583.00
7.8.8	300 amps x 450mm long	Each	4332.00
7.8.9	300 amps x 600mm long	Each	5509.00
7.8.10	300 amps x 900mm long	Each	8076.00
7.8.11	300 amps x 1200mm long	Each	10061.00
7.8.12	400 amps x 600mm long	Each	6349.00
7.8.13	400 amps x 900mm long	Each	9173.00
7.8.14	400 amps x 1200mm long	Each	11745.00
7.8.15	400 amps x 1500mm long	Each	14750.00
7.8.16	500 amps x 600mm long	Each	7568.00
7.8.17	500 amps x 900mm long	Each	10917.00
7.8.18	500 amps x 1200mm long	Each	14298.00
7.8.19	500 amps x 1500mm long	Each	17826.00
7.9	Providing and fixing metal clad, SP&N switch fuse unit (re-wirable), 230/250 volts, with porcelain re-wireble fuses including drilling holes on the board, connections, earthing the body etc. as per specification. (Thimbeling shall be paid separately).		

Code No.	Description	Unit	Rate Rs.
7.9.1	32 amps	Each	831.00
7.9.2	63 amps	Each	1498.00
7.10	Providing and fixing metal clad, TP&N switch fuse unit (re-wirable), 415/500 volts, with porcelain re-wireble fuses including drilling holes on the board, connections, earthing the body etc. as per specification. (Thimbeling shall be paid separately).		
7.10.1	32 amps	Each	787.00
7.10.2	63 amps	Each	1628.00
7.10.3	100 amps	Each	2969.00
7.10.4	200 amps	Each	4607.00
7.11	Providing and fixing porcelain re-wireble fuse carrier and base unit on wooden board including drilling holes on the board, screws, connections etc. as per specification. (Thimbeling shall be paid separately).		
7.11.1	16 amps	Each	49.00
7.11.2	32 amps	Each	77.00
7.11.3	63 amps	Each	138.00
7.11.4	100 amps	Each	247.00
7.11.5	200 amps	Each	462.00
7.11.6	300 amps	Each	677.00
7.12	Providing and fixing metal clad, TP&N double break fuse switch unit (HRC), 415/500 volts, with H.R.C. fuses including drilling holes on the board, connections, earthing the body etc. as per specification. (Thimbeling shall be paid separately).		
7.12.1	63 amps	Each	3125.00
7.12.2	100 amps	Each	4213.00
7.12.3	200 amps	Each	7124.00
7.12.4	320 amps	Each	7999.00
7.12.5	400 amps	Each	11435.00
7.12.6	500 amps	Each	16111.00
7.12.7	800 amps	Each	20056.00
7.13	Providing and fixing bolted connection type following H.R.C. fuses, with 80 KA breaking capacity in existing SFU/ FSU including bolts and nuts etc. as per specification.		
7.13.1	32 amps	Each	40.00
7.13.2	63 amps	Each	59.00
7.13.3	100 amps	Each	113.00
7.13.4	125 amps	Each	113.00
7.13.5	200 amps	Each	151.00
7.13.6	300 amps	Each	214.00
7.13.7	400 amps	Each	392.00

Code No.	Description	Unit	Rate Rs.
7.13.8	500 amps	Each	460.00
7.13.9	600 amps	Each	833.00
7.14	Providing and fixing knife (DIN) type following H.R.C. fuses, with 80 KA breaking capacity in existing SFU/ FSU including bolts and nuts etc. as per specification.		
7.14.1	32 amps	Each	122.00
7.14.2	63 amps	Each	126.00
7.14.3	100 amps	Each	134.00
7.14.4	125 amps	Each	175.00
7.14.5	200 amps	Each	276.00
7.14.6	300 amps	Each	395.00
7.14.7	400 amps	Each	410.00
7.14.8	500 amps	Each	598.00
7.14.9	600 amps	Each	598.00
7.15	Providing and making interconnection in cubical panel between BBC and switchgears with following size FRLS PVC insulated aluminium conductor wire lead of length upto 50cm including providing aluminium thimbles on both ends as per specification (To be measured separately for each phase/ neutral).		
7.15.1	10 Sqmm (32 amp)	Each	42.00
7.15.2	25 Sqmm (63 amp)	Each	47.00
7.15.3	50 Sqmm (100 amps)	Each	63.00
7.15.4	70 Sqmm (125 amps)	Each	80.00
7.16	Providing and making interconnection in cubical panel between BBC and switchgears with following size aluminium strip of length upto 50cm as per specification (To be measured separately for each phase/ neutral).		
7.16.1	20x5mm (100 amps)	Each	66.00
7.16.2	30x5mm (200 amps)	Each	86.00
7.16.3	50x5mm (300 amps)	Each	132.00
7.16.4	50x6mm (400 amps)	Each	148.00
7.16.5	75x6mm (500 amps)	Each	209.00
7.16.6	80x6mm (600 amps)	Each	219.00
7.16.7	100x6mm (800 amps)	Each	269.00
7.16.8	100x10mm (1000 amps)	Each	428.00
7.16.9	125x10mm (1200 amps)	Each	529.00
7.16.10	2 Nos 100x10mm (1600 amps)	Each	819.00
7.17	Providing and making interconnection in cubical panel between BBC and switchgears with following size FRLS PVC insulated copper conductor wire lead of length upto 50cm including providing copper thimbles on both ends as per specification (To be measured separately for each phase/ neutral).		

Code No.	Description	Unit	Rate Rs.
7.17.1	10 Sqmm (32 amp)	Each	65.00
7.17.2	16 Sqmm (63 amp)	Each	88.00
7.17.3	35 Sqmm (125 amps)	Each	154.00
7.18	Providing and making interconnection in cubical panel between BBC and switchgears with following size copper strip of length upto 50cm as per specification (To be measured separately for each phase/ neutral).		
7.18.1	20x3mm (100 amps)	Each	147.00
7.18.2	25x5mm (200 amps)	Each	252.00
7.18.3	40x5mm (300 amps)	Each	395.00
7.18.4	50x5mm (400 amps)	Each	482.00
7.18.5	60x5mm (500 amps)	Each	566.00
7.19	Fabrication, supply, installation, testing and commissioning of cubicle type compartmentalized wall/ floor mounted power cum control panel board of specified size and following depth made out of not less than 2 mm thick CRCA MS powder coated sheet with suitable size compartments for bus bars, switchgears and necessary cutouts for voltmeters, ammeters etc as per specifications including powder coating painting but without busbars, switchgears and other accessories etc complete as per specification. (Only face area is to be measured)		
7.19.1	Upto 300 mm deep	Sqm	5795.00
7.19.2	Above 300 mm and upto 450 mm deep	Sqm	6396.00
7.19.3	Above 450 mm and upto 600 mm deep	Sqm	7241.00
7.19.4	750 mm deep	Sqm	7687.00
7.19.5	900 mm deep	Sqm	8078.00
7.19.6	1200 mm deep	Sqm	8890.00
7.20	Supply, installation, testing and commissioning of 4 pole (3 phase + neutral) aluminium bus bars in existing cubicle type compartmentalized wall/ floor mounted panel board along with suitable size and shape insulators, necessary bolts and nuts etc complete as per specification.		
7.20.1	100 amp (20x5mm)	Metre	609.00
7.20.2	200 amp (30x5mm)	Metre	771.00
7.20.3	300 amp (50x5mm)	Metre	1136.00
7.20.4	400 amp (50x6mm)	Metre	1301.00
7.20.5	500 amp (75x6mm)	Metre	1775.00
7.20.6	600 amp (80x6mm)	Metre	1850.00
7.20.7	800 amp (100x6mm)	Metre	2349.00
7.20.8	1000 amp (100x10mm)	Metre	3618.00
7.20.9	1200 amp (125x10mm)	Metre	4389.00
7.20.10	1600 amp (2X100x6mm)	Metre	6836.00
7.20.11	2000 amp (2X125x10mm)	Metre	8521.00

Code No.	Description	Unit	Rate Rs.
7.20.12	2500 amp (3X125x10mm)	Metre	11933.00
7.20.13	3200 amp (4X100x10mm)	Metre	13065.00
7.20.14	4000 amp (4X125x10mm)	Metre	15609.00
7.21	Supply, installation, testing and commissioning of 4 pole (3 phase + neutral) copper (electric grade) bus bars in existing cubicle type compartmentalized wall/ floor mounted panel board along with suitable size and shape insulators, necessary bolts and nuts etc complete as per specification.		
7.21.1	100 amp (20x3mm)	Metre	1121.00
7.21.2	200 amp (25x5mm)	Metre	2025.00
7.21.3	300 amp (40x5mm)	Metre	2260.00
7.21.4	400 amp (50x5mm)	Metre	2970.00
7.21.5	500 amp (60x5mm)	Metre	3624.00

CHAPTER 8 - RISING MAINS AND BUS TRUNKING

RISING MAINS

(A) Application:

The rising mains are used in indoor for vertical power electrical distribution system in building 2 stories and above. This is more reliable and safe method as compared to rising cable system. Tap off boxes are provided on the rising mains at every floor or desired location.

(B) Construction:

The rising main shall comprise of sheet metal enclosure, bus bars, tap off points, fire barriers, expansion joints, thrust pads, end covers and fixing brackets.

The rising main shall conform to IS 8623 and IEC 439 and shall be suitable for 415V, 3 phase, 50 Hz supply and insulation of rising mains shall be capable of withstanding the voltage of 660 volt A.C. with specified degree of IP protection but not less than IP 42. The rising main shall be designed for temperature rise not exceeding 40°C over ambient temperature of 45°C and for specified short circuit rating

The rising mains shall be manufactured in convenient section to facilitate easy transportation and installation. Each section shall be provided with suitable wall straps at convenient intervals for fixing to the wall.

The front covers shall be detachable. Neoprene gaskets shall be provided between the covers and the side channels.

Built-in fireproof barriers having 2 hours fire rating shall be provided to restrict the spread of fire through the rising mains from one section to the adjacent section.

(i) Enclosure

The enclosure shall be made from sheet steel of 1.6 mm thickness.

(ii) Bus bars

- a. Rating: Bus bars shall be made of wrought aluminium or aluminium, alloy conforming to relevant Indian Standard, as specified.
- b. Current density: Bus bars shall be of sufficient cross-section so that a current density of 130 amp per sq.cm (800 amp per sq.inch) for aluminium bus bars, and 160 amp per sq.cm (1000 amp per sq. inch.) for copper bus bars is not exceeded at nominal current rating. The minimum sizes of sections of bus bars are given in Table III of Chapter-9. Up to 200A bus bars the cross section of the neutral bus bar shall be the same as that of the phase, for higher capacities, the neutral bus bar must not be less than half the cross-section of that of the phase bus bar.
- c. Insulation: Each bus bar shall be suitably insulated with PVC sleeves/ tapes. The insulation of the rising mains shall be capable of withstanding the voltage of 660V of A.C.
- d. Bus bar supports: Bus bar support insulators shall be of class F made of non-hygroscopic, non- combustible, track resistant and high strength FRP/ SMC/DMC material and of suitable size. The spacing between two bus bar support insulators should be suitable to withstand the dynamic stresses due to short circuit currents but not to exceed 250 mm.
- e. Bus bar Clearances:
The minimum clearance shall be 26mm for Phase to earth and 32mm for Phase to Phase.

CHAPTER 08 - RISING MAINS AND BUS TRUNKING

f. Bus Bar Jointing

Bus bar joints shall be thoroughly cleaned and a suitable oxidizing grease shall be applied before making the joint.

High tensile bolts, plain and spring washers shall be provided to ensure good contact at the joints.

The overlap of the bus bars at the joints shall be not less than the area of the cross section of the bus bars

g. Bus Bar Marking:

Bus bars and main connections shall be marked by color or letter as per standard practice.

(iii) Expansion joints:

Expansion joint made of aluminium strips shall be provided wherever necessary, to take care of expansion and contraction of the bus bars under normal operating conditions. This shall be invariably provided whenever the length of the rising mains exceeds 15m

(iv) Thrust Pads

The bus bars shall be provided with thrust pads so that the expansion of the conductors is upwards only.

The bus bar clamps and insulators shall be designed to permit free vertical movement of the bus bars during expansion and contraction

(v) Earthing

Two numbers of G.I. earth strips of 20x5 mm (for Rising main upto 400 Amp) and 20x6mm (for rising main above 400 upto 800 Amp.) shall be provided along side the rising mains enclosure, and shall be bolted to each section of the rising mains and will be connected to earthing system. The earthing strips shall be properly terminated to the main earth bars at the ends

(vi) Power incoming unit (To be paid as separate item)

Incoming cable will be connected to the rising main through an end feed unit, consisting of switch fuse unit with HRC fuse/MCCB/ACB of required capacity and cable end box.

(vii) Tap-off Unit (To be paid as separate item)

Tap-off boxes at specified intervals and height shall be provided on rising main to tap power. The box shall consists of set of HRC fuses or MCCB/Switch fuse unit, so that power from rising main can be switched ON/OFF and provided with suitable overload/ Short circuit protection.

(C) INSTALLATION OF RISING MAINS:

- (i)** Rising mains shall be installed on walls with suitable size steel fasteners in a shaft or other specified space.
- (ii)** No Structural member in the building shall be damaged/ altered, without prior approval from the competent authority.
- (iii)** Openings or cutouts in structure, provided by the department for the work, shall be used by the contractor. Necessary modifications to existing opening or fresh openings if required to be made, shall be carried out by the contractor at his cost in the scope of work.

CHAPTER 08 - RISING MAINS AND BUS TRUNKING

- (iv) All openings in floors provided by the Department (if size of opening is 50% of size required) shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by approved suitable means without any extra payment. Otherwise shall be closed by the contractor and will be paid extra.
- (v) All chases/cuttings required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

(D) Commissioning

After installation, pre-commissioning checks comprising checking the tightness of connections, body earth connection, merger test etc. shall be carried out and recorded.

BUSTRUNKING**(A) Application:**

These are generally provided for interconnections between the transformers of 400 KVA and above and DG sets 300 KVA and above and their switch board panels, and also for interconnections between large switch board panels where specified, thereby avoiding use of large sizes of cables for such interconnections.

(B) Construction:

The Bus trunking shall comprise of sheet metal enclosure, bus bars, fire barriers, expansion joints, end covers and fixing arrangements.

The Bus trunking shall be suitable for 415V, 3 phase, 50 Hz supply and insulation of Bus trunking shall be capable of withstanding the voltage of 660 volt A.C. with specified degree of IP protection but not less than IP 42 for indoor application and IP 54 for outdoor application. The Bus trunking shall be designed for temperature rise not exceeding 40°C over ambient temperature of 45°C and for specified short circuit rating

The Bus trunking shall be manufactured in convenient section to facilitate easy transportation and installation. If Bus trunking is to be installed outdoors, a metallic protecting canopy of adequate size shall be provided above the bus trunking (Canopy shall be paid separately)

Neoprene gaskets shall be provided between the detachable covers and the side channels. The provision for ventilation shall be made.

(i) Enclosure:

The enclosure shall be made from sheet steel of 2.0 mm thickness.

(ii) Bus bars:

Bus bar material, size, insulators, jointing, colour coding, insulation etc shall be provided of same specification as that of Rising mains.

(iii) Expansion joints:

Expansion joints shall be provided having same specification as that of Rising mains

(iv) Flexible joints:

Flexible connections shall be provided by braided or multi leafed conductors for terminations at transformer bushing and switchgear

CHAPTER 08 - RISING MAINS AND BUS TRUNKING

(v) Earthing

Two numbers earthing strips shall be provided having same specification as that of Rising mains

(C) Installation of bus trunking:

- (i) Each section of the enclosure shall be suspended from the ceiling slab with suitable MS suspenders and support angles/ channels. The runs shall be neat and the route shall be as directed by the Engineer-in-Charge.
- (ii) The bus trunking shall be supported such that its weight does not come on the terminations.
- (iii) Danger notice boards shall be provided on the bus trunking enclosure at suitable intervals in every room through which it passes.

(D) Commissioning:

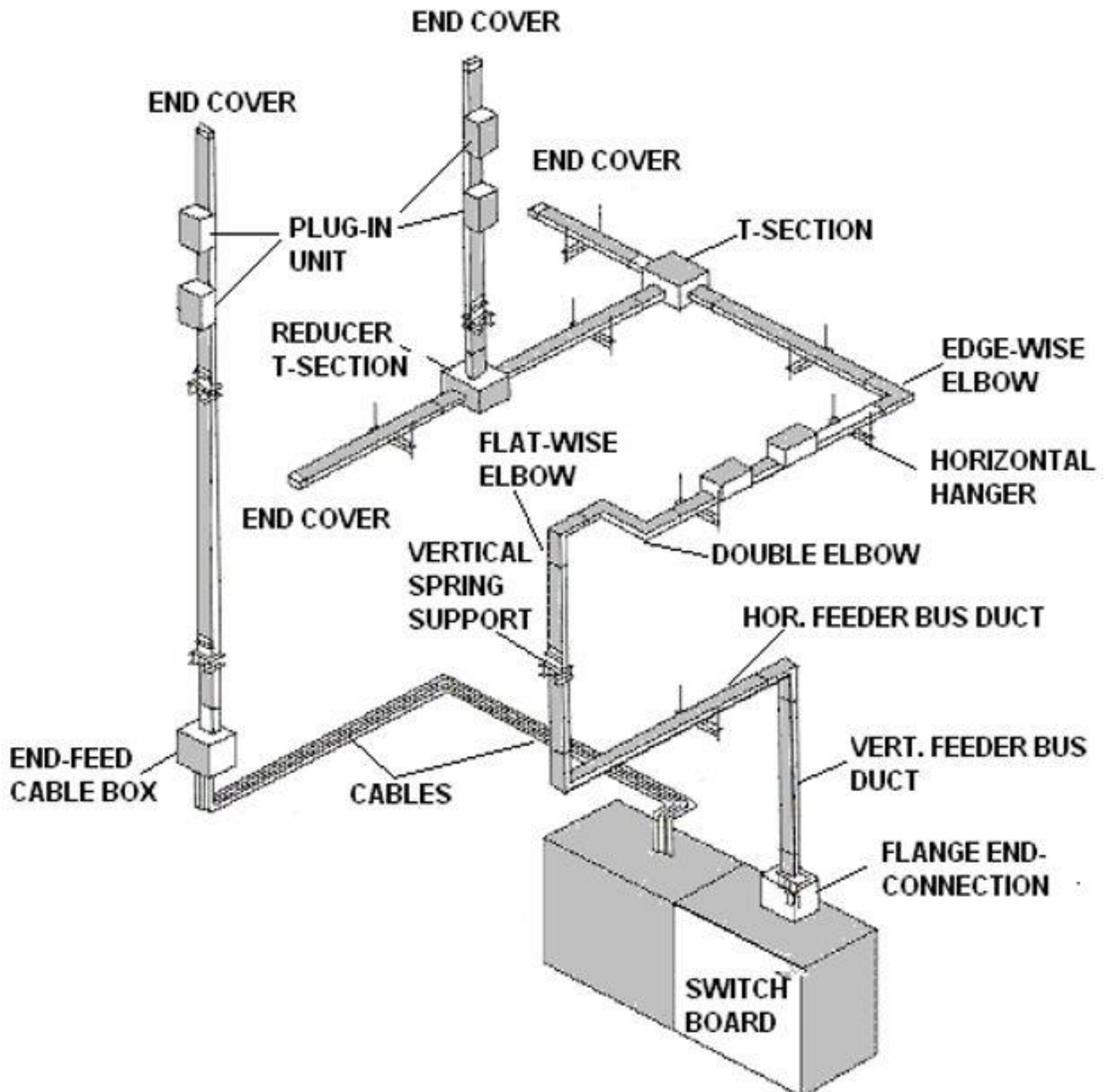
After installation, pre-commissioning checks comprising checking the tightness of connections, body earth connection, megger test etc. shall be carried out and recorded.

(E) MEASUREMENT:

Rising mains and bus trunking shall be measured in length along middle of width in metres correct to one cm.

- (F) RATE:** Cost of all material i.e. enclosure, bus bars, thrust pad, expansion joint, flexible joints, earth strips, installation/ fixing materials, dash fasteners etc, labour and machinery used in execution of work of shall be in the cost of item.

SLD of Bus Trunking Connection



The diagram illustrates a high-voltage (HT) panel configuration for 33KV or 11KV. At the top, two incoming lines, labeled "Line 33KV or 11KV Incomer No.1" and "Line 33KV or 11KV Incomer No.2", feed into the panel. The panel itself is a horizontal bar divided into five sections: "HT Outgoing", "Incomer No.1", "HT Bus Coupler", "Incomer No.2", and "HT Outgoing". Below the panel, the text "33KV or 11KV HT Panel" is centered. Two vertical lines, each marked with an "X" and labeled "LBS", connect the "HT Outgoing" sections to two identical feeders. Each feeder consists of a vertical line with two "VCB" (Vacuum Circuit Breaker) symbols and the text "To Transformers". At the bottom, a horizontal line connects the two feeders, marked with two "X" symbols and labeled "LBS". This horizontal line passes through a central box labeled "RMU 33KV or 11KV". Above this box, two vertical lines, each with a "VCB" symbol and the text "To Transformers", lead upwards.

CHAPTER 08 - RISING MAINS AND BUS TRUNKING

Code No.	Description	Unit	Rate Rs.
8.1	Supplying, installing on wall, testing and commissioning of following capacity rising mains in 2 mm thick sheet steel enclosure IP 42 rating (as per IS: 2147, and IS: 8623) duly painted with powder coating, wall straps, fully FRLS PVC insulated TPN aluminum busbars having current density of 130A/ sq cm at nominal current rating in convenient sections and suitable for 400/650 volts, 3 phase, 4 wire, 50 Hz, A.C. supply with extension joints, fire proof barriers, expansion joints, thrust pads including jointing, and earthing with 2 runs of galvanised iron strips etc. as per specification. (Rising mains confirming to IS 8623, IEC 61439)		
8.1.1	125 amps (S.C. rating for 1 sec - 15 KA)	Metre	3917.00
8.1.2	315 amps (S.C. rating for 1 sec - 20 KA)	Metre	4087.00
8.1.3	400 amps (S.C. rating for 1 sec - 25 KA)	Metre	5056.00
8.1.4	630 amps (S.C. rating for 1 sec - 45 KA)	Metre	5678.00
8.1.5	800 amps (S.C. rating for 1 sec - 50 KA)	Metre	6874.00
8.2	Supplying, installing, testing and commissioning of TPN tap off box of following capacity, made of 2 mm thick sheet steel enclosure duly painted with powder coating, on existing rising mains with space for TP Disconnecter switch/ MCCB (without switch/MCCB), interconnections with copper lead and copper lugs/thimbles, earthing etc. as per specification:		
8.2.1	100 amps	Each	877.00
8.2.2	200 amps	Each	1267.00
8.2.3	250 amps	Each	2374.00
8.2.4	400 amps	Each	4741.00
8.3	Supplying, installation, including suspension, testing and commissioning of following capacity bus trunking with aluminium busbars having current density of 130A/ sq cm at nominal current rating in 2 mm thick sheet steel enclosure IP 42 rating (as per IS: 2147, and IS: 8623) in convenient sections for use on, 3 phase, 4 wire, 415 volts, 50 Hz, A.C. supply including jointing of sections, flexible joints, expansion joints, bends and earthing with 2 runs of galvanised iron strips, suspenders, angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification.		
8.3.1	800 amps	Metre	6599.00
8.3.2	1000 amps	Metre	7801.00
8.3.3	1250 amps	Metre	9941.00
8.3.4	1600 amps	Metre	12457.00
8.3.5	2500 amps	Metre	14369.00

Code No.	Description	Unit	Rate Rs.
8.4	Supplying, installing on wall, testing and commissioning of following capacity Air Insulated COMPACT TYPE RISING MAINS for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with enclosure having IP-54 rating (as per IS: 2147, and IS: 8623) after fixing the tap off boxes and all accessories, made of 2 mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos aluminium busbars having current density of 130A/ sq cm at nominal current rating necessary joints & expansion joints, fire barrier at each floor, provision of tapping at every metre, continuous earthing with 2 Nos aluminium strip of suitable size (one on each side) including, G.I. clamping brackets, angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification:		
8.4.1	200 amps 15KA SC for 1 sec	Metre	4055.00
8.4.2	315 amps 25KA SC for 1 sec	Metre	4397.00
8.4.3	400 amps 30KA SC for 1 sec	Metre	4859.00
8.4.4	500 amps 35KA SC for 1 sec	Metre	5612.00
8.4.5	630 amps 50KA SC for 1 sec	Metre	6691.00
8.4.6	800 amps 50KA SC for 1 sec	Metre	9256.00
8.4.7	1000 amps 50KA SC for 1 sec	Metre	10791.00
8.4.8	1250 amps 50KA SC for 1 sec	Metre	12798.00
8.5	Supplying, installing on wall, testing and commissioning of following capacity Air Insulated COMPACT TYPE BUS TRUNKING for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with metal clad enclosure having IP-54 rating (as per IS: 2147, and IS: 8623) after fixing the tap off boxes and all accessories, made of 2 mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos aluminium busbars having current density of 130A/ sq cm at nominal current rating necessary joints, elbow joints & expansion joints, fire barrier at each floor, provision of tapping at every metre, continuous earthing with 2 Nos aluminium strip of suitable size (one on each side) including, G.I. clamping brackets, angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification:		
8.5.1	200 amps 15KA SC for 1 sec	Metre	4454.00
8.5.2	315 amps 25KA SC for 1 sec	Metre	5076.00
8.5.3	400 amps 30KA SC for 1 sec	Metre	5341.00
8.5.4	500 amps 35KA SC for 1 sec	Metre	6152.00
8.5.5	630 amps 50KA SC for 1 sec	Metre	7351.00
8.5.6	800 amps 50KA SC for 1 sec	Metre	10036.00
8.5.7	1000 amps 50KA SC for 1 sec	Metre	11709.00
8.5.8	1250 amps 50KA SC for 1 sec	Metre	14080.00

Code No.	Description	Unit	Rate Rs.
8.6	Supplying, installing suspension ON CEILING, testing and commissioning of following capacity Air Insulated COMPACT TYPE BUS TRUNKING for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with metal clad enclosure having IP-54 rating (as per IS: 2147, and IS: 8623) after fixing the tap off boxes and all accessories, made of 2 mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos aluminium busbars having current density of 130A/ sq cm at nominal current rating , necessary joints, elbow joints & expansion joints, fire barrier at each floor, provision of tapping at every metre, continuous earthing with 2 Nos aluminium strip of suitable size (one on each side) including, G.I. clamping brackets, suspenders, angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification:		
8.6.1	200 amps 15KA SC for 1 sec	Metre	4485.00
8.6.2	315 amps 25KA SC for 1 sec	Metre	5098.00
8.6.3	400 amps 30KA SC for 1 sec	Metre	5380.00
8.6.4	500 amps 35KA SC for 1 sec	Metre	6176.00
8.6.5	630 amps 50KA SC for 1 sec	Metre	7383.00
8.6.6	800 amps 50KA SC for 1 sec	Metre	10053.00
8.6.7	1000 amps 50KA SC for 1 sec	Metre	11722.00
8.6.8	1250 amps 50KA SC for 1 sec	Metre	14143.00
8.7	Supplying, installing, End Feed Unit and connecting to existing general/ Compact Type bus trunking/ Rising mains, of following capacity for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply made with 2 mm thick steel sheet enclosure duly powder coated with space provision of Disconnector switch/ MCCB/ ACB (but without Switch/MCCB/ACB) complete with necessary joints including clamping brackets, angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification:		
8.7.1	200 amps 15KA SC for 1 sec	Each	3179.00
8.7.2	315 amps 25KA SC for 1 sec	Each	3429.00
8.7.3	400 amps 30KA SC for 1 sec	Each	4393.00
8.7.4	500 amps 35KA SC for 1 sec	Each	4593.00
8.7.5	630 amps 50KA SC for 1 sec	Each	5657.00
8.7.6	800 amps 50KA SC for 1 sec	Each	7115.00
8.7.7	1000 amps 50KA SC for 1 sec	Each	7609.00
8.7.8	1250 amps 50KA SC for 1 sec	Each	8302.00
8.8	Supplying, installing, connecting to existing Air Insulated Compact Type bus trunking/ rising mains, testing and commissioning of following capacity Plug In/ Tap Off Box for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with 2 mm thick steel sheet enclosure duly powder coated with provision of MCCB (but without MCCB) complete etc. as per specification:		

Code No.	Description	Unit	Rate Rs.
8.8.1	125 amps 15KA SC for 1 sec	Each	3658.00
8.8.2	200 amps 25KA SC for 1 sec	Each	4718.00
8.8.3	315 amps 30KA SC for 1 sec	Each	6242.00
8.8.4	400 amps 35KA SC for 1 sec	Each	6242.00
8.8.5	500 amps 50KA SC for 1 sec	Each	8654.00
8.8.6	630 amps 50KA SC for 1 sec	Each	8654.00
8.9	Supplying, installing by suspension on ceiling, testing and commissioning of following capacity COMPACT SANDWICH TYPE BUS TRUNKING for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with metal clad enclosure having IP-54 rating (as per IS: 2147, and IS: 8623) after fixing the tap off boxes and all accessories, made of 2 mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos aluminium busbars having current density of 130A/ sq cm at nominal current rating, necessary joints, elbow joints & expansion joints and bends, fire barrier at each floor, provision of tapping at every metre, adopter box and copper flexible for joints, continuous earthing with 2 Nos aluminium strip of suitable size (one on each side) including, G.I. clamping brackets, suspenders, angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification:		
8.9.1	400 amps 25KA SC for 1 sec	Metre	7238.00
8.9.2	500 amps 30KA SC for 1 sec	Metre	7909.00
8.9.3	630 amps 50KA SC for 1 sec	Metre	8536.00
8.9.4	800 amps 50KA SC for 1 sec	Metre	10399.00
8.9.5	1000 amps 50KA SC for 1 sec	Metre	11731.00
8.9.6	1250 amps 50KA SC for 1 sec	Metre	13382.00
8.9.7	1600 amps 50KA SC for 1 sec	Metre	16896.00
8.9.8	2000 amps 50KA SC for 1 sec	Metre	19855.00
8.9.9	2500 amps 50KA SC for 1 sec	Metre	26876.00
8.9.10	3200 amps 50KA SC for 1 sec	Metre	30104.00
8.9.11	4000 amps 50KA SC for 1 sec	Metre	41829.00
8.10	Supplying, installing by suspension on ceiling, testing and commissioning of following capacity COMPACT SANDWICH TYPE BUS TRUNKING for use on 3 phase 4 wire 415 volts, 50Hz A.C. supply with metal clad enclosure having IP-54 rating (as per IS: 2147, and IS: 8623) after fixing the tap off boxes and all accessories, made of 2 mm thick steel sheet duly powder coated in convenient sections complete with 4 Nos Copper bus bars, necessary joints, elbow joints & expansion joints and bends, fire barrier at each floor, provision of tapping at every metre, adopter box and copper flexible for joints, continuous earthing with 2 Nos Copper strip of suitable size (one on each side) including, G.I. clamping brackets, suspenders,		

Code No.	Description	Unit	Rate Rs.
	angle iron bracket, steel fasteners, connecting to earthing system etc. as per specification:		
8.10.1	630 amps 40KA SC for 1 sec	Metre	16522.00
8.10.2	800 amps 50KA SC for 1 sec	Metre	19788.00
8.10.3	1000 amps 65KA SC for 1 sec	Metre	21973.00
8.10.4	1250 amps 85KA SC for 1 sec	Metre	25021.00
8.10.5	1600 amps 100KA SC for 1 sec	Metre	38230.00
8.10.6	2000 amps 100KA SC for 1 sec	Metre	48391.00
8.10.7	2500 amps 120KA SC for 1 sec	Metre	58551.00
8.10.8	3200 amps 150KA SC for 1 sec	Metre	76333.00
8.10.9	4000 amps 150KA SC for 1 sec	Metre	86494.00
8.11	Supply, installation, testing and commissioning of 33 KV ring mains unit with 2 LBS (load break switch) & 1 VCB 25 kA for 1 Sec. 630 A outdoor (IP 54); rated voltage 36 KV, safeplus safeopro: 36 KV extensible outdoor safeplus manual. Metal enclosed switchgear: IEC 62271-200; general purpose switches : IEC 60265-1; disconnectors and earthing switches: IEC 62271-102; switch fuse combination: IEC 62271-105 common clauses : IEC 60694; pressure of SF6 gas : 1.4 bar at 20 deg C.; cable bushing outside cone; CENELEC IN 50181 interface C temp. class; -25 deg. C to ± 40 deg. C indoor; Degree of protection: - SF6 tank: IP 67 - Fusecanisters : IP 67 - Front Cover: IP 2X - Cable Cover: IP 3X - Enclosure : IP 54 Busbars : 306 sq mm copper; earthbar (external): 120 sq mm copper; bolt dimension: M10; thickness of stainless steel tank: 2.0 mm; Covers; - Front cover: RAL 7065; - Side and cable cover : RAL 7035 - Electrical data & dash; 36 KV - Each terminal voltage : 33 KV; rated frequency: 50 Hz; rated current for busbar : 630 A; Rated current for cable switch disconnector : 630 A; short time with stand current (3 sec.) Cable switch disconnector : 20 kA rms; Rated current for Transformer T-off: 200/630 A; Short time with stand current (3 sec.) V-module vacuum circuit breaker 20 kA rms: Impluse With stand voltage. To earth and between phases: 170 KV insulation level : power frequency 1 min. : 70 KV, including all accessories, terminal kits etc. complete as required.	Each	1564330.00

Code No.	Description	Unit	Rate Rs.
8.12	Supply, installation, testing and commissioning of 33 KV ring mains unit with 2 LBS (load break switch) & 2 VCB 25 kA for 1 Sec. 630 A outdoor (IP 54); rated voltage 36 KV, safeplus safeopro: 36 KV extensible outdoor safeplus manual. Metal enclosed switchgear: IEC 62271-200; general purpose switches : IEC 60265-1; disconnectors and earthing switches: IEC 62271-102; switch fuse combination: IEC 62271-105 common clauses : IEC 60694; pressure of SF6 gas : 1.4 bar at 20 deg C.; cable bushing outside cone; CENELEC IN 50181 interface C temp. class; -25 deg. C to $\pm$ 40 deg. C indoor; Degree of protection: - SF6 tank: IP 67 - Fusecanisters : IP 67 - Front Cover: IP 2X - Cable Cover: IP 3X - Enclosure : IP 54 Busbars : 306 sq mm copper; earthbar (external): 120 sq mm copper; bolt dimension: M10; thickness of stainless steel tank: 2.0 mm; Covers; - Front cover: RAL 7065; - Side and cable cover : RAL 7035 - Electrical data & dash; 36 KV - Each terminal voltage : 33 KV; rated frequency: 50 Hz; rated current for busbar : 630 A; Rated current for cable switch disconnector : 630 A; short time with stand current (3 sec.) Cable switch disconnector : 20 kA rms; Rated current for Transformer T-off: 200/630 A; Short time with stand current (3 sec.) V-module vacuum circuit breaker 20 kA rms: Impluse With stand voltage. To earth and between phases: 170 KV insulation level : power frequency 1 min. : 70 KV, including all accessories, terminal kits etc. as complete required.	Each	2185228.00

CHAPTER 9 - MAIN SWITCHES, MCCB'S, MCB'S & MCB DB'S

(A) MATERIALS:

All MCCB's, MCB's MCB DB's RCCB's and industrial socket out lets shall be of approved make and ISI marked only.

(B) MEASUREMENT:

Measurements shall be made by counting items in numbers.

(C) RATE: Cost of all material, fixing/ installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
9.1	Providing and fixing following rating and breaking capacity MCCB in existing cubicle panel board including drilling holes in cubicle panel, making connections, etc. as per specification, IS/ IEC: 60947-2 and Ics = 100 % Icu.		
9.1.1	3 pole MCCB, 25-63A, Fixed Thermal Release, 10KA	Each	1261.00
9.1.2	3 pole MCCB, 80-100A, Fixed Thermal Release, 10KA	Each	1360.00
9.1.3	3 pole MCCB, 25-100A, Adjustable Thermal Release, 18KA	Each	2027.00
9.1.4	3 pole MCCB, 100A, Adjustable Thermal - Magnetic Release, 25KA	Each	3174.00
9.1.5	3 pole MCCB, 125A, Adjustable Thermal - Magnetic Release, 25KA	Each	4879.00
9.1.6	3 pole MCCB, 160A, Adjustable Thermal - Magnetic Release, 25KA	Each	6480.00
9.1.7	3 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 25KA	Each	8291.00
9.1.8	3 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 25KA	Each	9815.00
9.1.9	3 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 35KA	Each	10205.00
9.1.10	3 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 35KA	Each	11101.00
9.1.11	3 pole MCCB, 320A, Adjustable Thermal - Magnetic Release, 35KA	Each	11843.00
9.1.12	3 pole MCCB, 400A, Adjustable Thermal - Magnetic Release, 35KA	Each	12087.00
9.1.13	3 pole MCCB, 500A, Adjustable Thermal - Magnetic Release, 35KA	Each	14674.00
9.1.14	3 pole MCCB, 630A, Adjustable Thermal - Magnetic Release, 35KA	Each	16847.00
9.1.15	3 pole MCCB, 400A, Adjustable Thermal - Magnetic Release, 50KA	Each	14130.00
9.1.16	3 pole MCCB, 500A, Adjustable Thermal - Magnetic Release, 50KA	Each	16039.00
9.1.17	3 pole MCCB, 630A, Adjustable Thermal - Magnetic Release, 50KA	Each	17066.00
9.1.18	3 pole MCCB, 250A, Adjustable Microprocessor Release, 35KA	Each	12866.00
9.1.19	3 pole MCCB, 400A, Adjustable Microprocessor Release, 35KA	Each	15217.00
9.1.20	3 pole MCCB, 630A, Adjustable Microprocessor Release, 35KA	Each	16623.00
9.1.21	3 pole MCCB, 400A, Adjustable Microprocessor Release, 50KA	Each	16704.00
9.1.22	3 pole MCCB, 630A, Adjustable Microprocessor Release, 50KA	Each	18139.00
9.1.23	3 pole MCCB, 800A, Adjustable Microprocessor Release, 50KA	Each	28875.00

Code No.	Description	Unit	Rate Rs.
9.1.24	4 pole MCCB, 100A, Adjustable Thermal - Magnetic Release, 35KA	Each	5421.00
9.1.25	4 pole MCCB, 125A, Adjustable Thermal - Magnetic Release, 35KA	Each	6314.00
9.1.26	4 pole MCCB, 160A, Adjustable Thermal - Magnetic Release, 35KA	Each	7649.00
9.1.27	4 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 35KA	Each	11093.00
9.1.28	4 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 35KA	Each	11990.00
9.1.29	4 pole MCCB, 320A, Adjustable Thermal - Magnetic Release, 35KA	Each	15031.00
9.1.30	4 pole MCCB, 100A, Adjustable Thermal - Magnetic Release, 50KA	Each	7127.00
9.1.31	4 pole MCCB, 125A, Adjustable Thermal - Magnetic Release, 50KA	Each	8729.00
9.1.32	4 pole MCCB, 160A, Adjustable Thermal - Magnetic Release, 50KA	Each	9912.00
9.1.33	4 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 50KA	Each	13812.00
9.1.34	4 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 50KA	Each	14431.00
9.1.35	4 pole MCCB, 320A, Adjustable Thermal - Magnetic Release, 50KA	Each	17001.00
9.1.36	4 pole MCCB, 400A, Adjustable Thermal - Magnetic Release, 50KA	Each	17303.00
9.1.37	4 pole MCCB, 500A, Adjustable Thermal - Magnetic Release, 50KA	Each	20379.00
9.1.38	4 pole MCCB, 630A, Adjustable Thermal - Magnetic Release, 50KA	Each	21797.00
9.1.39	4 pole MCCB, 100A, Adjustable Microprocessor Release, 35KA	Each	12039.00
9.1.40	4 pole MCCB, 125A, Adjustable Microprocessor Release, 35KA	Each	13400.00
9.1.41	4 pole MCCB, 160A, Adjustable Microprocessor Release, 35KA	Each	14555.00
9.1.42	4 pole MCCB, 200A, Adjustable Microprocessor Release, 35KA	Each	15955.00
9.1.43	4 pole MCCB, 250A, Adjustable Microprocessor Release, 35KA	Each	17033.00
9.1.44	4 pole MCCB, 320A, Adjustable Microprocessor Release, 35KA	Each	20599.00
9.1.45	4 pole MCCB, 100A, Adjustable Microprocessor Release, 50KA	Each	12897.00
9.1.46	4 pole MCCB, 125A, Adjustable Microprocessor Release, 50KA	Each	13697.00
9.1.47	4 pole MCCB, 160A, Adjustable Microprocessor Release, 50KA	Each	15569.00
9.1.48	4 pole MCCB, 200A, Adjustable Microprocessor Release, 50KA	Each	17167.00
9.1.49	4 pole MCCB, 250A, Adjustable Microprocessor Release, 50KA	Each	19040.00
9.1.50	4 pole MCCB, 320A, Adjustable Microprocessor Release, 50KA	Each	20636.00
9.1.51	4 pole MCCB, 400A, Adjustable Microprocessor Release, 50KA	Each	22155.00
9.1.52	4 pole MCCB, 630A, Adjustable Microprocessor Release, 50KA	Each	23970.00
9.2	Supplying and fixing on surface/ recess following way, 240 volts SP&N MCB distribution board of sheet steel phosphatized and powder painted complete with tinned copper busbar, neutral busbar, earth bar, din bar, detachable gland plate, including interconnections, earthing etc. as per specification. (But without MCB/RCCB/Isolator)		
9.2.1	4 way, Single door	Each	482.00
9.2.2	8 way, Single door	Each	598.00
9.2.3	12 way, Single door	Each	689.00
9.2.4	16 way, Single door	Each	810.00
9.2.5	4 way, Double door	Each	666.00
9.2.6	8 way, Double door	Each	804.00

Code No.	Description	Unit	Rate Rs.
9.2.7	12 way, Double door	Each	936.00
9.2.8	16 way, Double door	Each	1138.00
9.3	Supplying and fixing on surface/ recess following way, 240 volts SP&N MCB distribution board consumer unit of sheet steel phosphatized and powder painted, complete with tinned copper busbar, neutral busbar, earth bar, din bar, detachable gland plate, including interconnections, earthing etc. as per specification. (But without MCB/RCCB/Isolator)		
9.3.1	2 + 4 way	Each	530.00
9.3.2	2 + 8 way	Each	667.00
9.3.3	2 + 12 way	Each	805.00
9.3.4	2 + 16 way	Each	878.00
9.4	Supplying and fixing on surface/ recess horizontal type following way, 415 volts, TPN MCB distribution board of sheet steel phosphatized and powder painted, complete with tinned copper busbar, neutral busbar, earth bar, din bar, detachable gland plate, including interconnections, earthing etc. as per specification. (But without MCB/RCCB/Isolator)		
9.4.1	4 way Single door	Each	1119.00
9.4.2	6 way Single door	Each	1359.00
9.4.3	8 way Single door	Each	1668.00
9.4.4	4 way Double door	Each	1459.00
9.4.5	6 way Double door	Each	1732.00
9.4.6	8 way Double door	Each	2165.00
9.5	Supplying and fixing on surface/ recess vertical type following way, 415 volts, TPN MCB distribution board of sheet steel phosphatized and powder painted, with 200 amps tinned copper busbar, common neutral link, earth bar, din bar, detachable gland/ knock out plate, including interconnections, earthing etc. as per specification. (But without MCB/RCCB/Isolator) (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.)		
9.5.1	4 way (4 + 12), Single door	Each	3159.00
9.5.2	8 way (4 + 24), Single door	Each	3835.00
9.5.3	12 way (4 + 36), Single door	Each	5477.00
9.5.4	4 way (4 + 12), Double door	Each	3527.00
9.5.5	8 way (4 + 24), Double door	Each	4367.00
9.5.6	12 way (4 + 36), Double door	Each	5797.00
9.6	Supplying and fixing on surface/ recess vertical type following way, 415 volts, TPN MCB distribution board of sheet steel phosphatized and powder painted, with 200 amps tinned copper busbar, common neutral link, earth bar, din bar, detachable gland/ knock out plate, provision for 63/100 amp MCCB as incomer including interconnection between incomer MCCB and		

Code No.	Description	Unit	Rate Rs.
	busbars, earthing etc. as per specification. (But without MCCB and MCB) (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.)		
9.6.1	4 way (4 + 12), Single door with provision for 100 amps MCCB as incomer	Each	3205.00
9.6.2	8 way (4 + 24), Single door with provision for 100 amps MCCB as incomer	Each	3839.00
9.6.3	12 way (4 + 36), Single door with provision for 100 amps MCCB as incomer	Each	5154.00
9.6.4	4 way (4 + 12), Double door with provision for 100 amps MCCB as incomer	Each	3899.00
9.6.5	8 way (4 + 24), Double door with provision for 100 amps MCCB as incomer	Each	4524.00
9.6.6	12 way (4 + 36), Double door with provision for 100 amps MCCB as incomer	Each	5784.00
9.7	Supplying and fixing on surface/ recess prewired following way, 240 volts SP&N, MCB distribution board of sheet steel phosphatized and powder painted complete with loose wire box, terminal blocks, tinned copper busbar, neutral link, earth bar, din bar, detachable gland plate, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks including interconnections, earthing etc. as per specification. (But without MCB/ RCCB/ Isolator)		
9.7.1	2 + 4 way, Single door	Each	1337.00
9.7.2	2 + 8 way, Single door	Each	1639.00
9.7.3	2 + 12 way, Single door	Each	1967.00
9.7.4	2 + 4 way, Double door	Each	1706.00
9.7.5	2 + 8 way, Double door	Each	2026.00
9.7.6	2 + 12 way, Double door	Each	2461.00
9.8	Supplying and fixing on surface/ recess prewired horizontal type following way, 415 volts TP&N, MCB distribution board of sheet steel phosphatized and powder painted complete complete with loose wire box, terminal blocks, tinned copper busbar, neutral link, earth bar, din bar, detachable gland plate, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks including interconnections, earthing etc. as per specification. (But without MCB/ RCCB/ Isolator)		
9.8.1	4 way (4 + 12), Single door	Each	4357.00
9.8.2	6 way (4 + 18), Single door	Each	5684.00
9.8.3	8 way (4 + 24), Single door	Each	6501.00
9.8.4	12 way (4 + 36), Single door	Each	8026.00
9.8.5	4 way (4 + 12), Double door	Each	5018.00
9.8.6	6 way (4 + 18), Double door	Each	6625.00
9.8.7	8 way (4 + 24), Double door	Each	7166.00
9.8.8	12 way (4 + 36), Double door	Each	8729.00
9.9	Supplying and fixing on surface/ recess prewired vertical type following way, 415 volts TP&N, MCB distribution board of sheet steel phosphatized and powder painted complete with loose wire box, terminal blocks, 200		

Code No.	Description	Unit	Rate Rs.
	amps tinned copper busbar, common neutral link, earth bar, din bar, detachable gland plate, loose wire box, superior make terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks including interconnections, earthing etc. as per specification. (But without MCB/ RCCB/ Isolator) (Note: Prewired vertical type MCB TPDB is normally used where 3 phase outlets are required.)		
9.9.1	4 way (4 + 12), Single door	Each	5068.00
9.9.2	6 way (4 + 18), Single door	Each	6640.00
9.9.3	8 way (4 + 24), Single door	Each	8118.00
9.9.4	12 way (4 + 36), Single door	Each	10831.00
9.9.5	4 way (4 + 12), Double door	Each	5844.00
9.9.6	6 way (4 + 18), Double door	Each	7633.00
9.9.7	8 way (4 + 24), Double door	Each	8877.00
9.9.8	12 way (4 + 36), Double door	Each	11950.00
9.10	Supplying and fixing SP MCB, 240 volts, 'B' curve, suitable for lighting and other loads in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.10.1	6 amps to 32 amps	Each	128.00
9.10.2	40 amps	Each	266.00
9.11	Supplying and fixing SP MCB, 240 volts, 'C' curve, suitable for inductive load in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.11.1	0.5 amps to 5/6 amps	Each	182.00
9.11.2	6 amps to 32 amps	Each	126.00
9.11.3	40 amps	Each	257.00
9.12	Supplying and fixing DP MCB, 240 volts, 'C' curve, suitable for lighting and other loads in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.12.1	0.5 amps to 5/6 amps	Each	490.00
9.12.2	6 amps to 32 amps	Each	349.00
9.12.3	40 amps	Each	548.00
9.12.4	50 amps	Each	556.00
9.12.5	63 amps	Each	547.00
9.13	Supplying and fixing DP MCB, 240 volts, 'D' curve, suitable for inductive/ motor load in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.13.1	0.5 amps to 5/6 amps	Each	479.00
9.13.2	6 amps to 32 amps	Each	364.00
9.13.3	40 amps	Each	593.00

Code No.	Description	Unit	Rate Rs.
9.13.4	50 amps	Each	585.00
9.13.5	63 amps	Each	585.00
9.14	Supplying and fixing TP MCB, 440 volts, 'C' curve, suitable for lighting and other loads in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.14.1	0.5 amps to 5/6 amps	Each	745.00
9.14.2	6 amps to 32 amps	Each	567.00
9.14.3	40 amps	Each	845.00
9.14.4	50 amps	Each	847.00
9.14.5	63 amps	Each	847.00
9.15	Supplying and fixing TP MCB, 440 volts, 'D' curve, suitable for inductive/ motor load in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.15.1	0.5 amps to 5/6 amps	Each	745.00
9.15.2	6 amps to 32 amps	Each	583.00
9.15.3	40 amps	Each	915.00
9.15.4	50 amps	Each	921.00
9.15.5	63 amps	Each	921.00
9.16	Supplying and fixing TP&N MCB, 440 volts, 'C' curve, suitable for lighting and other loads in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.16.1	0.5 amps to 5/6 amps	Each	943.00
9.16.2	6 amps to 32 amps	Each	751.00
9.16.3	40 amps	Each	1084.00
9.16.4	50 amps	Each	1119.00
9.16.5	63 amps	Each	1119.00
9.17	Supplying and fixing TP&N MCB, 440 volts, 'D' curve, suitable for inductive/ motor load in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.17.1	0.5 amps to 5/6 amps	Each	942.00
9.17.2	6 amps to 32 amps	Each	793.00
9.17.3	40 amps	Each	1148.00
9.17.4	50 amps	Each	1127.00
9.17.5	63 amps	Each	1127.00
9.18	Supplying and fixing 4 Pole MCB, 440 volts in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.18.1	80 amps	Each	4706.00
9.18.2	100 amps	Each	4855.00
9.18.3	125 amps	Each	5432.00

Code No.	Description	Unit	Rate Rs.
9.19	Supplying and fixing following rating, 240 volts TWO POLE ISOLATOR in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.19.1	25 amps	Each	188.00
9.19.2	40 amps	Each	224.00
9.19.3	63 amps	Each	286.00
9.20	Supplying and fixing following rating, 415 volts, FOUR POLES, ISOLATOR in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.20.1	40 amps	Each	483.00
9.20.2	63 amps	Each	528.00
9.20.3	100 amps	Each	550.00
9.21	Supplying and fixing following rating, double pole, (single phase and neutral), 240 volts, residual current circuit breaker (RCCB), having a sensitivity current up to 300 milliamperes in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.21.1	25 amps	Each	1296.00
9.21.2	40 amps	Each	1510.00
9.21.3	63 amps	Each	1753.00
9.22	Supplying and fixing following rating, four pole, (three phase and neutral), 415 volts, residual current circuit breaker (RCCB), having a sensitivity current up to 300 milliamperes in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.		
9.22.1	25 amps	Each	1714.00
9.22.2	40 amps	Each	1730.00
9.22.3	63 amps	Each	1980.00
9.23	Supplying and fixing single pole blanking plate in the existing MCB DB complete etc. as per specification.	Each	6.00
9.24	Supplying and fixing 2 pole and earth, 240 volts, industrial type, socket outlet, enclosed metal plug top along with SP MCB in sheet steel enclosure, on surface or in recess, with chained metal cover for the socket out let and complete with connections, testing and commissioning etc. as per specification.		
9.24.1	20 Amp with "C" curve MCB	Each	830.00
9.24.2	32 Amp with "C" curve MCB	Each	842.00
9.25	Supplying and fixing TPN and earth, 440 volts, industrial type, socket outlet, enclosed metal plug top along with MCB, in sheet steel enclosure, on surface or in recess, with chained metal cover for the socket out let and complete with connections, testing and commissioning etc. as per specification.		

Code No.	Description	Unit	Rate Rs.
9.25.1	20 Amp with "C" curve TP MCB	Each	1876.00
9.25.2	32 Amp with "C" curve TP MCB	Each	2305.00
9.26	Supplying and fixing sheet steel enclosure of suitable size made of 1.6mm thick CRCA MS sheet, for 100 amps MCCB on existing metal board/ wall including painting etc as per specification.	Each	369.00
9.27	Supplying and fixing Low voltage (class -II) surge protection device (SPD) TP&N 440 volts, in the existing MCB DB complete with connections, testing and commissioning etc. as per specification.	Each	7013.00

CHAPTER 10 - ACB'S, PANEL MOUNTING SWITCHES & ACCESSORIES

(A) MATERIALS:

All ACB's, TP&N switches, change over switches, starters, and other accessories, for which ISI certification is there, shall be of approved make and ISI marked only. All other accessories, for which ISI certification has not been issued, shall be of reputed and approved make.

(B) MEASUREMENT:

Measurements shall be made by counting items in numbers

(C) RATE: Cost of all material, fixing/ installation material, labour and machinery used in execution of work of shall be deemed included in the cost of item.

Code No.	Description	Unit	Rate Rs.
10.1	Providing and fixing approved make, Manually Operated, draw out type, 415/500 volts, air circuit breaker complete with all standard accessories as per manufacturers specifications including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as required, lcs = lcu = lcw for 1 second, IS/IEC: 60898.		
10.1.1	800 amps, 3 pole, 50 KA	Each	92828.00
10.1.2	1250 amps, 3 pole, 50 KA	Each	101510.00
10.1.3	1600 amps, 3 pole, 50 KA	Each	118165.00
10.1.4	2000 amps, 3 pole, 50 KA	Each	144755.00
10.1.5	3200 amps, 3 pole, 65 KA	Each	208103.00
10.1.6	4000 amps, 3 pole, 65 KA	Each	252466.00
10.1.7	800 amps, 4 pole, 50 KA	Each	108431.00
10.1.8	1250 amps, 4 pole, 50 KA	Each	131196.00
10.1.9	1600 amps, 4 pole, 50 KA	Each	144852.00
10.1.10	2000 amps, 4 pole, 50 KA	Each	173584.00
10.1.11	3200 amps, 4 pole, 65 KA	Each	274116.00
10.1.12	4000 amps, 4 pole, 65 KA	Each	319404.00
10.2	Providing and fixing approved make, Electrically Operated, draw out type, 415/500 volts, 4 pole air circuit breaker complete with all standard accessories as per manufacturers specifications including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as per specification and lcs = lcu = lcw for 1 second, IS/IEC: 60898.		
10.2.1	800 amps, 4 pole, 50 KA	Each	140509.00
10.2.2	1250 amps, 4 pole, 50 KA	Each	160095.00
10.2.3	1600 amps, 4 pole, 50 KA	Each	170680.00
10.2.4	2000 amps, 4 pole, 50 KA	Each	210175.00
10.2.5	3200 amps, 4 pole, 65 KA	Each	299938.00
10.2.6	4000 amps, 4 pole, 65 KA	Each	345226.00

Code No.	Description	Unit	Rate Rs.
10.3	Providing installation testing and commissioning of approved make, 11 KV 1600 amp out door type VCB as per IS 13118 and additional specification suitable for use on 11KV 3 phase 50 Hz AC supply with rated capacity 26.3kA for 3 Sec insulation level 28 kV rms 75 kV peak with heater and spring charging motor operatable on 230 V AC supply complete with all standard accessories as per manufacturers specifications on existing CC foundation (excluding the cost of CC foundation) including connections, earthing the body etc. as per specification.	Each	260938.00
10.4	Providing installation testing and commissioning of approved make, 33 KV VCB 1250 amp out door type as per IS 13118 and additional specification suitable for use on 33 KV 3 phase 50 Hz AC supply with rated capacity 26.3kA for 3 Sec insulation level 70 kV rms 170 kV peak with heater and spring charging motor operatable on 230 V AC supply complete with all standard accessories as per manufacturers specifications on existing CC foundation (excluding the cost of CC foundation) including connections, earthing the body etc. as per specification.	Each	490820.00
10.5	Providing and fixing following capacity TP&N disconnecter fuse switch unit inside the existing cubicle panel board with ISI marked HRC fuses including drilling holes in cubicle panel, making connections, testing and commissioning etc as per specification. (Connecting lead if required shall be paid separately)		
10.5.1	32 Amp TP&N	Each	961.00
10.5.2	63 Amp TP&N	Each	1301.00
10.5.3	100 Amp TP&N	Each	2514.00
10.5.4	125 Amp TP&N	Each	3273.00
10.5.5	160 Amp TP&N	Each	3559.00
10.5.6	200 Amp TP&N	Each	4138.00
10.5.7	320 Amp TP&N	Each	6649.00
10.5.8	400 Amp TP&N	Each	8315.00
10.6	Providing and fixing metal clad, 4 pole, on load change over switch unit (without sheet steel enclosure), 415/500 volts, in cubicle panel including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as per specification. (Connecting lead if required shall be paid separately)		
10.6.1	63 amps	Each	3132.00
10.6.2	100 amps	Each	4111.00
10.6.3	200 amps	Each	8101.00
10.6.4	315 amps	Each	12249.00
10.6.5	400 amps	Each	18006.00
10.6.6	630 amps	Each	21071.00

Code No.	Description	Unit	Rate Rs.
10.6.7	800 amps	Each	31221.00
10.7	Providing and fixing metal clad, 4 pole, on load change over switch unit (with sheet steel enclosure), 415/500 volts, in cubicle panel including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as per specification. (Connecting lead if required shall be paid separately)		
10.7.1	63 amps	Each	4491.00
10.7.2	100 amps	Each	5717.00
10.7.3	200 amps	Each	10006.00
10.7.4	315 amps	Each	15455.00
10.7.5	400 amps	Each	22476.00
10.7.6	630 amps	Each	26022.00
10.7.7	800 amps	Each	38701.00
10.8	Providing and fixing metal clad, TP&N motorized change over switch unit, 415/500 volts, including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as per specification.		
10.8.1	125 amps	Each	22783.00
10.8.2	200 amps	Each	25020.00
10.8.3	250 amps	Each	31561.00
10.8.4	320 amps	Each	32122.00
10.8.5	400 amps	Each	40440.00
10.8.6	630 amps	Each	43248.00
10.8.7	800 amps	Each	66003.00
10.9	Providing and fixing metal clad, TP&N 4 pole automatic change over switch unit, 415/500 volts, including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as per specification.		
10.9.1	125 amps	Each	36331.00
10.9.2	160 amps	Each	41219.00
10.9.3	250 amps	Each	52576.00
10.9.4	400 amps	Each	64728.00
10.9.5	630 amps	Each	83382.00
10.9.6	800 amps	Each	115065.00
10.9.7	1000 amps	Each	126963.00
10.10	Providing and fixing metal clad, TP&N 415/500 volts, By Pass Switch Unit with sheet steel enclosure including drilling holes on the board, connections, earthing the body, testing and commissioning etc. as per specification.		
10.10.1	125 amps	Each	11595.00
10.10.2	200 amps	Each	14191.00
10.10.3	250 amps	Each	20569.00

Code No.	Description	Unit	Rate Rs.
10.10.4	320 amps	Each	21293.00
10.10.5	400 amps	Each	31442.00
10.10.6	630 amps	Each	36948.00
10.10.7	800 amps	Each	53597.00
10.11	Providing and fixing following rating motor starter on metal board including, connections, testing and commissioning etc. as per specification.		
10.11.1	DOL single phase 16 amps	Each	857.00
10.11.2	DOL three phase 16 amps	Each	1117.00
10.11.3	DOL three phase 32 amps	Each	1787.00
10.11.4	DOL three phase 63 amps	Each	2591.00
10.11.5	Automatic Star Delta three phase 16 amps	Each	4274.00
10.11.6	Automatic Star Delta three phase 32 amps	Each	4240.00
10.11.7	Automatic Star Delta three phase 63 amps	Each	7007.00
10.12	Providing and fixing 2 pole, 230/250 volts following rating power contactor in existing starter/ cubical panel including, connections, testing and commissioning etc. as per specification.		
10.12.1	16 amps	Each	354.00
10.12.2	32 amps	Each	447.00
10.12.3	63 amps	Each	573.00
10.13	Providing and fixing 3 pole, 415/500 volts following rating (AC-1 Duty) power contactor in existing starter/ cubical panel including, connections, testing and commissioning etc. as per specification.		
10.13.1	25 amps	Each	450.00
10.13.2	40 amps	Each	801.00
10.13.3	60 amps	Each	2772.00
10.13.4	100 amps	Each	5758.00
10.13.5	200 amps	Each	9251.00
10.13.6	315 amps	Each	15663.00
10.13.7	400 amps	Each	23169.00
10.14	Providing and fixing 4 pole, 415/500 volts following rating (AC-1 Duty) power contactor in existing starter/ cubical panel including, connections, testing and commissioning etc. as per specification.		
10.14.1	25 amps	Each	774.00
10.14.2	40 amps	Each	1209.00
10.14.3	60 amps	Each	2977.00
10.14.4	100 amps	Each	6236.00
10.14.5	200 amps	Each	12480.00
10.14.6	315 amps	Each	23481.00
10.14.7	400 amps	Each	30342.00

Code No.	Description	Unit	Rate Rs.
10.15	Providing and fixing following rating current transformer in existing cubical panel including, connections, testing and commissioning etc. as per specification.		
10.15.1	50/5 amps	Each	281.00
10.15.2	100/5 amps	Each	297.00
10.15.3	200/5 amps	Each	295.00
10.15.4	315/5 amps	Each	303.00
10.15.5	400/5 amps	Each	290.00
10.15.6	500/5 amps	Each	307.00
10.15.7	800/5 amps	Each	355.00
10.15.8	1000/5 amps	Each	363.00
10.15.9	1200/5 amps	Each	391.00
10.15.10	1600/5 amps	Each	416.00
10.15.11	2000/5 amps	Each	432.00
10.15.12	2500/5 amps	Each	471.00
10.15.13	3000/5 amps	Each	540.00
10.15.14	3200/5 amps	Each	597.00
10.15.15	4000/5 amps	Each	962.00
10.16	Providing and fixing single phasing preventer in existing panel including connection, testing and commissioning as per specification.	Each	348.00
10.17	Providing and fixing penal mounting 230 volt LED type indicating lamp in existing cubical panel including, connections, testing and commissioning etc. as per specification.	Each	80.00
10.18	Providing and fixing penal mounting following rating analog type ammeter of size 100x100 (NS) in existing cubical panel including, connections, testing and commissioning etc. as per specification.		
10.18.1	0-50 amps	Each	285.00
10.18.2	0-100 amps	Each	316.00
10.18.3	0-200 amps	Each	389.00
10.18.4	0-500 amps	Each	389.00
10.18.5	0-1000 amps	Each	389.00
10.19	Providing and fixing penal mounting digital type ammeter of size 100x100 (NS) in existing cubical panel including, connections, testing and commissioning etc. as per specification	Each	829.00
10.20	Providing and fixing penal mounting 0-500 volt voltmeter of size 100x100 (NS) in existing cubical panel including, connections, testing and commissioning etc. as per specification.		
10.20.1	Analog type	Each	337.00
10.20.2	Digital type	Each	710.00
10.21	Providing and fixing penal mounting selector switch in existing cubical panel		0.00

Code No.	Description	Unit	Rate Rs.
	including, connections, testing and commissioning etc. as per specification.		
10.21.1	For voltmeter	Each	161.00
10.21.2	For ammeter	Each	176.00
10.22	Providing and fixing following Time switch (timer) in existing panel including connection, testing and commissioning as per specification.		
10.22.1	Digital type	Each	1616.00
10.22.2	Analoge type	Each	2146.00
10.22.3	Astronomical type with year programmed	Each	2942.00
10.23	Providing and fixing panel mounting digital type VAF (Volt-amp-frequency combined) multifunction meter of size 100x100 (NS) in existing cubical panel including connection, testing and commissioning etc. as per specification.	Each	1021.00

CHAPTER 11 - UPS, INVERTERS

(A) MATERIALS:

All UPS, INVERTERS and batteries shall be of reputed and approved make.

(B) MEASUREMENT:

Measurements shall be made by counting items in numbers

(C) RATE: Cost of all material, fixing/ installation material, labour and machinery used in execution of work of shall be deemed included in the cost of item.

Code No.	Description	Unit	Rate Rs.
11.1	Supplying, installation, testing and commissioning following rating single phase, 230 volts OFF-LINE UPS (sine wave) with built-in battery including connection as per specification.		
11.1.1	0.65 KVA	Each	2472.00
11.1.2	1.00 KVA	Each	3683.00
11.1.3	1.50 KVA	Each	7122.00
11.2	Supplying, installation, testing and commissioning following rating single phase in single phase out ON-LINE UPS including connection etc but without batteries as per specification.		
11.2.1	2 KVA with DC bus voltage 72 V	Each	23260.00
11.2.2	3 KVA with DC bus voltage 72 V	Each	28073.00
11.2.3	5 KVA with DC bus voltage 180 V	Each	39713.00
11.3	Supplying, installation, testing and commissioning following rating single phase 230 volts sine wave inverter (without battery) including connection as per specification.		
11.3.1	0.65 KVA	Each	2551.00
11.3.2	0.90 KVA	Each	3016.00
11.3.3	1.50 KVA	Each	4678.00
11.4	Supplying, installation, testing and commissioning following rating (Sealed Maintenance Free) lead acid battery including connection as per specification.		
11.4.1	42 AH	Each	4412.00
11.4.2	65 AH	Each	6066.00
11.4.3	100 AH	Each	8517.00
11.4.4	120 AH	Each	10305.00
11.4.5	150 AH	Each	12114.00
11.4.6	200 AH	Each	15977.00
11.5	Supplying, installation, testing and commissioning following rating lead acid battery (Maintenance Type) including connection as per specification.		
11.5.1	100 AH	Each	7517.00
11.5.2	120 AH	Each	9428.00
11.5.3	150 AH	Each	12113.00
11.5.4	200 AH	Each	14323.00

CHAPTER 12 - EARTHING (as per IS Code 3043: 1987(R 2016))

(A) APPLICATION

- (i) In electrical distribution system neutral is earthed at the transformer/ generator end.
- (ii) In addition separate provision is made for earthing the metallic body of equipments and non-current carrying metallic components in the sub-station.
- (iii) Earthing system is also required for earthing the metallic body of internal/external electrical installations.
- (iv) Earthing system is also required for lighting protection, computer installations and hospital operation theaters, etc. for functional reasons
- (v) Earthing requirements are laid down in Indian Electricity Rules, 1956, as amended from time to time, and in the Regulations of the Electricity supply Authority concerned. These shall be complied with.

(B) DESIGN CRITERIA

- (i) The length of strip earth electrode shall be not less than 15 m. This length shall suitably be increased if necessary, on the basis of the information available about soil resistance, so that the required earth resistance is obtained. Prior approval of the Engineer-in-Charge shall be taken for any such increase in length.
- (ii) The earthing conductor from the electrode up to the building shall be protected from mechanical injury by a medium class, 15 mm dia. GI pipe in the case of wire, and by 40 mm dia, medium class GI pipe in the case of strip

(C) MATERIAL

- (i) Earth electrode shall be either Pipe earth electrode or Plate earth electrode or Strip or conductor earth electrode as specified.
- (ii) GI pipe electrodes shall be 40mm dia medium class 4.5 m long without any joint cut tapered at the bottom, and provided with holes of 12mm dia, drilled not less than 7.5 cm from each other upto 2 m of length from the bottom.
- (iii) G.I. earth plate shall be of size 600mm X 600mm X 6mm thick.
- (iv) Copper earth plate shall be of size 600mm X 600mm X 3mm thick.
- (v) G.I. earth strip cross section shall be minimum 100 sq.mm (25mm x 4mm) and maximum 150 sq.mm.
- (vi) Copper earth strip cross section shall be minimum 60 sq.mm (20mm x 3mm) and maximum 100 sq.mm.
- (vii) Earthing conductor larger than the maximum cross sectional areas need not be used unless otherwise specified
- (viii) All hardware items used for connecting the earthing conductor with the electrode shall be of GI in case of GI pipe and GI plate earth electrodes, and of forged tinned brass in case of copper plate electrodes.

Note: Galvanization of GI items shall conform to Class IV of IS: 4736-1986.

(D) LOCATION FOR EARTH ELECTRODES

- (i) The preferable location will be there where soil has a reasonable chance of retaining moist.
- (ii) The location of the earth electrode will not be closer than 1.5 m from any building and Entrances, pavements and roadways, should be avoided.

CHAPTER 12 - EARTHING

- (iii) If more than one pipe electrode is to be installed, a minimum distance of 2 m shall be maintained between two adjacent electrodes.
- (iv) While excavating for earth electrode care shall be taken that excavation does not affect the foundation of the building, in such cases, earth electrode may be located away from the building, with the prior approval of the Engineer-in-Charge.

(E) INSTALLATION

Common

- (i) If more than one pipe/ plate electrode is to be installed, a minimum distance of 2 m shall be maintained between two adjacent electrodes.
- (ii) The pipe/ plate earthing attachments shall be housed in a masonry enclosure of size not less than 30cm x 30cm x 30cm with cast iron/ MS frame having 6 mm thick MS cover and locking arrangement suitably embedded in the masonry enclosure.
- (iii) The earthing conductor run in protection pipe in ground shall be buried at least 30 cm deep (to be increased to 60 cm in case of road crossing and pavement). The portion within the building shall be concealed in walls and floors to adequate depth in due co-ordination with the building work.

Pipe Earth Electrode

- (i) Pipe electrode shall be buried in the ground vertically with its top at not less than 20 cm below the ground level.
- (ii) If full length of pipe electrode is not possible to be installed due to meeting a water table, hard soil or rock, the length of electrode may be reduced, provided the required earth resistance result is achieved with or without additional electrodes. Alternative method of earthing may be adapted with the prior approval of the Engineer-in-Charge.
- (iii) A 40 mm x 20 mm reducer shall be provided on the top of pipe earth electrode and above reducer funnel with wire mesh shall be provided.
- (iv) Earthing conductor shall be secured to pipe earth electrode using a through bolt, nut and washers.

Plate Earth Electrode

- (i) Plate electrode shall be buried in ground with its faces vertical, and its top not less than 1.5 m below the ground level.
- (ii) A watering pipe 20 mm dia. medium class shall be provided and attached to the electrodes. A funnel with wire mesh shall be provided on the top of this pipe for watering the earth.
- (iii) The earthing conductor shall be securely terminated on to the plate with two bolts, nuts, check nuts and washers.

Strip Earth Electrode

- (i) The strip or conductor electrode shall be buried in trench not less than 0.5 m deep.
- (ii) If more than one strips or conductors electrode are required, they shall be laid preferably in a number of trenches radiating from one point and alternatively in a single straight trench as widely distributed as possible.

CHAPTER 12 - EARTHING

- (iii) If the electrode cannot be laid in a straight length, it may be laid in a zigzag manner with a deviation upto 45 degrees from the axis of the strip. It can also be laid in the form of an arc with curvature more than 1 m or a polygon.

Earth Conductor

- (i) The earthing conductor at the other end, shall be securely connected by crimped lug, bolt, nut and washer in the case of wire, and Bolt, nut and washer in case of strip conductor, to the earth stud/ earth bar on the switch board, to earthing terminal/ neutral point in the case of substation or alternators as the case may be.
- (ii) Two earth conductors shall be provided for a switchboard carrying a 3- phase switchgear thereon.
- (iii) Loop earthing of individual units will not be however necessary in the case of cubicle type switchboards.

(F) ARTIFICIAL TREATMENT OF SOIL

When artificial treatment of soil is to be resorted to, the electrode shall be surrounded by charcoal/ coke and salt. In such cases, excavation for earth electrode shall be increases as per the dimensions indicated in figures.

(G) EARTH RESISTANCE

The earth resistance at each electrode shall be measured with an approved earth testing apparatus. No earth electrode shall have a ohmic resistance greater than 5 ohms as measured. In rocky soil the resistance may be up to 8 ohms.

Where the above stated earth resistance is not achieved, necessary improvement shall be made by additional provision, such as additional electrode(s), different type of electrode, or artificial chemical treatment of soil etc., as may be directed by the Engineer-in-charge

(H) MARKING

- (i) Earth bars/ terminal at all switch boards shall be marked permanently, either as "E"
- (ii) Main earthing terminal shall be marked " SAFETY EARTH- DO NOT DISCONNCET",

(I) MEASUREMENT:

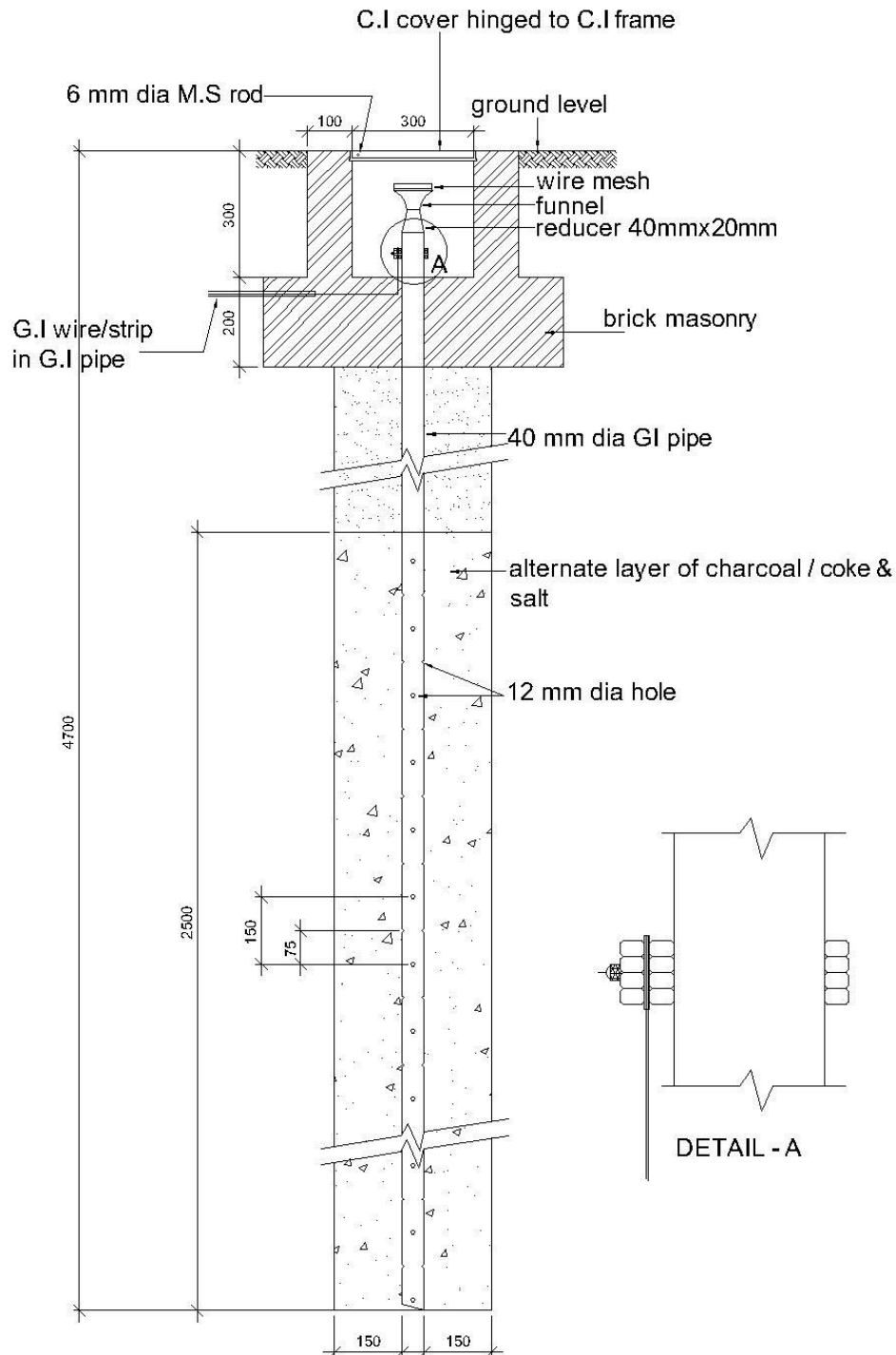
Earth conductor shall be measured in length in metre correct to 1 cm and earth electrode shall be measured by counting items in numbers

- (J) **RATE:** Cost of all material, fixing/ installation material, labour and machinery used in execution of work of shall be deemed to be included in the cost of item.

- (K) Dimensional drawing for pipe and plate earthing are Below.

CHAPTER 12 - EARTHING

PIPE EARTHING

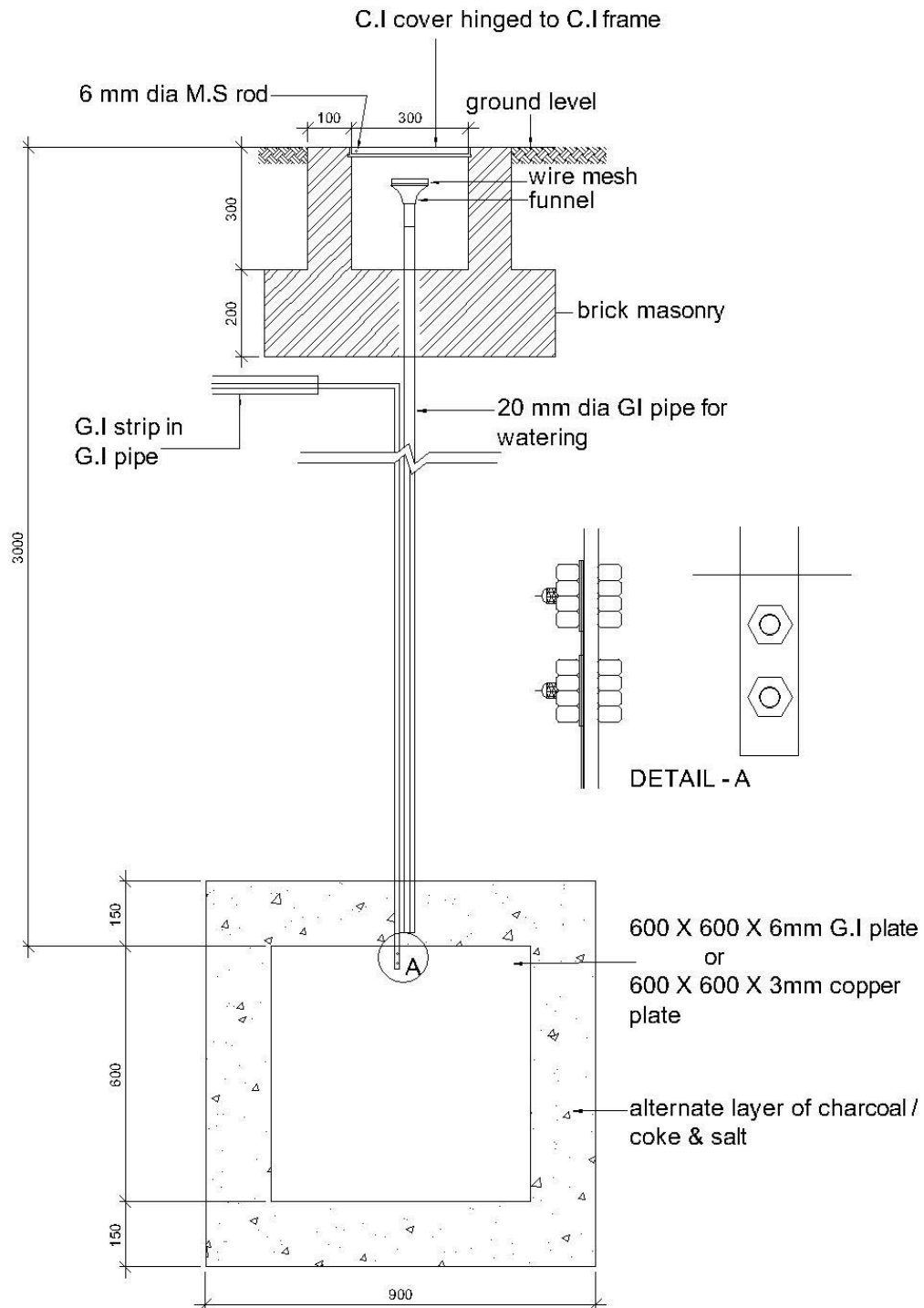


ALL DIMENSIONS ARE IN MM

NOTE: For pipe earthing without charcoal/ coke & salt excavation with auger or any other means making hole of lesser dia (100mm) shall be permitted.

CHAPTER 12 - EARTHING

PLATE EARTHING



ALL DIMENSIONS ARE IN MM

CHAPTER 12 - EARTHING

Code No.	Description	Unit	Rate Rs.
	PIPE EARTH ELECTRODE		
12.1	Earthing with G.I. earth pipe 4.5 metre long, 40 mm dia including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. with charcoal and salt as per specification and IS Code 3043: 1987(R 2016)	Set	2757.00
12.2	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe, with charcoal and salt as per specification and IS Code 3043: 1987(R 2016)	Set	3174.00
	PLATE EARTH ELECTRODE		
12.3	Earthing with copper earth plate 600 mm X 600 mm X 3 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe, with charcoal and salt as per specification and IS Code 3043: 1987(R 2016)	Set	5278.00
12.4	Supplying and laying 8 SWG copper wire at 0.50 metre below ground level for conductor earth electrode, including soldering etc. as per specification.	Metre	65.00
12.5	Supplying and laying 25 mm X 5 mm copper strip at 0.50 metre below ground as strip earth electrode, including soldering, excavation and refilling the trench etc. as per specification.	Metre	436.00
	COPPER WIRE / STRIP CONNECTION		
12.6	Providing and fixing 25 mm X 5 mm copper strip in 40 mm dia G.I. pipe from earth electrode at 0.5 Metre depth below ground level including excavation and refilling the trench etc. as per specification.	Metre	639.00
12.7	Providing and laying earth connection from earth electrode with 4.00 mm dia copper wire in 15 mm dia G.I. pipe from earth electrode at 0.5 Metre depth below ground level including excavation and refilling the trench etc. as per specification.	Metre	130.00
12.8	Providing and fixing 25 mm X 5 mm copper strip on surface or in recess for connections etc. as per specification.	Metre	449.00
12.9	Providing and fixing 4.00 mm dia copper wire on surface or in recess for loop earthing as per specification.	Metre	62.00
12.10	Providing and fixing 4.00 mm dia copper wire on surface or in recess for loop earthing along with existing surface/ concealed conduit/ submain wiring/ cable as per specification.	Metre	45.00
12.11	Providing and fixing earth bus of 50 mm X 5 mm copper strip on surface for connections etc. as per specification.	Metre	805.00
12.12	Supplying and laying 6 SWG G.I. wire at 0.50 metre below ground level for conductor earth electrode, including soldering, excavation and refilling the trench etc. as per specification.	Metre	31.00

Code No.	Description	Unit	Rate Rs.
12.13	Supplying and laying 25 mm X 6 mm G.I. strip at 0.50 metre below ground as strip earth electrode, including soldering, excavation and refilling the trench etc. as per specification.	Metre	80.00
12.14	Providing and fixing 25 mm X 5 mm G.I. strip in 40 mm dia G.I. pipe from earth electrode at 0.5 Metre depth below ground level including excavation and refilling the trench etc. as per specification.	Metre	293.00
12.15	Providing and laying earth connection from earth electrode with 6 SWG dia G.I. Wire in 15 mm dia G.I. pipe from earth electrode at 0.5 Metre depth below ground level including excavation and refilling the trench etc. as per specification.	Metre	107.00
12.16	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as per specification.	Metre	98.00
12.17	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing as per specification.	Metre	32.00
12.18	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing along with existing surface/ concealed conduit/ submain wiring/ cable as per specification.	Metre	16.00
12.19	Providing maintenance free earthing with following size GI pipe including making bore pit of minimum 150mm dia, providing and laying approved make Earthing Electrode of Pipe-in-Pipe technology as per IS 3043(R 2016) -1987 made of corrosion free G.I. Pipes having outer pipe of 80mm dia and inner pipe of 50mm dia and filling with specified qty highly conductive compound around pipe and above that with soft soil in bore pit complete and providing masonry enclosure with cover plate having locking arrangement and watering pipe etc. as per specification:		
12.19.1	With 3 metre long GI Pipes and 50 kg back filling compound.	Each	9312.00
12.19.2	With 2 metre long GI Pipes and 25 kg back filling compound.	Each	6989.00
12.20	Excavation for foundation in soft soil/hard soil including dressing of sides and ramming of bottoms, lifting and getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 metres	Cum	143.00

CHAPTER 13 – LIGHTENING CONDUCTOR

(A) APPLICATION

Installation of lightening conductor system is required for protection of building against lighting. For details not covered in these specifications, reference may be made to IS: 2309-1989. The decision to provide or not to provide the lightening conductor system shall be taken by the competent authority considering all relevant factors.

The main components of a lighting protective system are-

- a) Air terminations,
- b) Down conductors,
- c) Joint and bonds,
- d) Testing joints,
- e) Earth terminations
- f) Earth electrodes.

(B) DESIGN

EARTH TERMINATION NETWORK

- (i) An earth station comprising one or more earth electrodes as required should be connected to each down conductor.
- (ii) Each of the earth stations should have a resistance not exceeding the product given by 10 ohms multiplied by the number of earth electrodes to be provided therein. The whole of the lightening protective system, including any ring earth, should have a combined resistance to earth not exceeding 10 ohms without taking account of any bonding.
- (iii) If the value obtained for the whole of the lightening protection system exceeds 10 ohms, a reduction can be achieved by extending or adding to the electrodes or by interconnecting the individual earth terminations of the down conductors by a conductor installed below ground, sometimes referred to as a ring conductor. Buried ring conductors laid in this manner are considered to be an integral part of the earth termination network, and should be taken into account when assessing the overall value of resistance to earth of the installation.
- (iv) A reduction of the resistance to the earth to a value below 10 ohms has the advantage of further reducing the potential gradient around the earth electrode when discharging lightening current. It also further reduces the risk of side flashing to metal in, or of structure.
- (v) Earth electrodes should be capable of being isolated and a reference earth point should be provided for testing purposes.

LAYOUT

- (i) The system design and layout shall be done in accordance with IS: 2309-1989 and specified in the tender documents.
- (ii) Air termination networks may consist of vertical or horizontal conductors, or combinations of both.
- (iii) For the purpose of lightening protection, the vertical and horizontal conductors are considered equivalent and the use of pointed air terminations, or vertical finial is therefore, not regarded as essential.
- (iv) A single pointed vertical air termination shall be used and shall project at least 30 cm, above the object, salient point or network on which it is fixed.
- (v) For a flat roof, horizontal air termination along the outer perimeter of the roof shall be used forming a closed network. Parallel horizontal conductors shall be installed for roof of larger area. No part of the roof should be more than 9 m from the nearest horizontal protective conductor.

CHAPTER 13 - LIGHTENING CONDUCTOR

- (vi) For a flat roof, horizontal air termination along the outer perimeter of the roof shall be used forming a closed network. Parallel horizontal conductors shall be installed for roof of larger area. No part of the roof should be more than 9 m from the nearest horizontal protective conductor.
- (vii) Horizontal air terminations should be carried along the contours such as ridges, parapets and edges of flat roofs, and, where necessary, over flat surfaces, in such a way as to join each air termination to the rest, and should themselves form a closed network.
- (viii) All metallic projections including reinforcement, on or above the main surface of the roof which are connected to the general mass of the earth, should be bonded and form a part of the air termination network.
- (ix) If portions of a structure vary considerably in height, the air termination network for the lower portions should be bonded to the down conductors of the taller portions, in addition to their own down conductors.
- (x) The number and spacing of down conductors shall be as specified, or as directed by the Engineer-in-Charge.
- (xi) In deciding on the routing of the down conductor, its accessibility for inspection, testing and maintenance should be taken into consideration.
- (xii) A down conductor should follow shortest and direct possible path between the air terminal network and the earth termination network. Where more than one down conductor is used, the conductors should be arranged as evenly as practicable around the out side walls of the structures.
- (xiii) The walls of light wells may be used for fixing down conductors, but lift shafts should not be used for this purpose.
- (xiv) Metal pipes leading rainwater from the roof to the ground may be connected to the down conductors, but cannot replace them, such connections should have disconnecting joints.
- (xv) Where the provision of external routes for down conductors is impracticable, for example, in buildings of cantilever construction for the first floor upwards, down conductors should not follow the outside contours of the building. To do so would create a hazard to persons standing under the over hang in such cases, the down conductors may be housed in air space provided by a nonmetallic and noncombustible internal duct and taken straight down to the ground.
- (xvi) Any suitable covered recess, not smaller than 76mm x 13mm, or any suitable vertical service duct running the full height of the building may be used for this purpose, provided it does not contain an unarmored or a non-metal sheathed cable.
- (xvii) In cases where an unrestricted duct is used, seals at each floor level may be required for fire protection. As far as possible, access to the interior of the duct should be available.
- (xviii) The lightning protective system should be so installed that it does not spoil the architectural or aesthetic beauty of the building.

(C) MATERIAL

The materials of protective system shall be reliably resistant to corrosion, or be adequately protected against corrosion. One of the following material shall be used.

- (i) Copper: Solid or flat copper strip of at least 98% conductivity conforming to relevant I.S. specification.
- (ii) Galvanized steel: Steel thoroughly protected against corrosion by a zinc coating.
- (iii) All air terminations and down conductors shall be of GI except where the atmospheric conditions necessitating the use of copper.
- (iv) G.I. earth strip size shall be 25mm x 4mm for above ground and 32mm x 6mm for below ground.

CHAPTER 13 - LIGHTENING CONDUCTOR

- (v) Copper earth strip size shall be 20mm x 3mm for above ground and 25mm x 4mm for below ground.
- (vi) Copper earth strip size shall be 20mm x 3mm for above ground and 25mm x 4mm for below ground.

Note: Galvanization of GI items shall conform to Class IV of IS: 4736-1986.

(D) INSTALLATION**Lightening Conductors**

- (i) Conductors shall be securely attached to the building, or other object to be protected by galvanized steel fasteners.
- (ii) The lightening conductors shall be secured not more than 1.2 m apart for horizontal run, and 1 m for vertical run.
- (iii) All air terminals shall be effectively secured against overturning.

Down Conductors

Down conductors are to be installed taking most direct down route. When most direct route can not be followed, such as arise at the end of roof, cornices or parapets, the such cornices or parapets should be provided with holes through which the conductor can pass freely. Where making through hole is not possible the sharp bends are permissible but the length of the conductor forming loop should not exceeds 8 times the width of the open side of the loop to avoid lightening discharge jump across open side of loop.

JOINTS

- (i) A lightening protective system should have as few joints as possible.
- (ii) Joints should be mechanically and electrically effective.
- (iii) In overlapping joints, the length of the overlap should not be less than 20 mm for all types of conductors.
- (iv) While jointing contact surfaces should first be cleaned, and then inhibited from oxidation with a suitable non-corrosive compound.
- (v) Joints of dissimilar metals should be protected against corrosion or erosion from the elements, or the environment and should present an adequate contact area.
- (vi) Each down conductor should be provided with a test joint in convenient position.

(E) MEASUREMENT:

Earth conductor shall be measured in length in metre correct to 1 cm and finials, joints etc shall be measured by counting items in numbers

- (G) RATE:** Cost of all material, fixing/ installation material, labour and machinery used in execution of work of shall be deemed included in the cost of item.

(H) NOT TO DONE

- (i) Any metal forming a part of the structure, or any building services having metallic parts which are in contact with the general mass of the earth, should be either isolated from, or bonded to the down conductor.
- (ii) All exposed large metal items having any dimension greater than 2 metre whether connected to the earth or not shall not be bonded to a lightening protective system.
- (iii) Structures supporting overhead electric supply, telephone and other lines shall not be bonded to a lightening protective system.
- (iv) Gas pipe shall not be bonded to the lightening protective earth termination system

Code No.	Description	Unit	Rate Rs.
13.1	Providing and fixing of lightning conductor finial, made of 25 mm dia 300 mm long, copper tube, having single prong at top, with 85 mm dia 3 mm thick copper base plate having 4 nos holes for fixing etc. complete as per specification.	Each	652.00
13.2	Making jointing of copper tape (with another copper tape, base of the finial or any other metallic object) by reverting, sweating and soldering/ nut bolting of as per specification.	Each	43.00
13.3	Providing and fixing copper tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as per specification.(For horizontal run)	Metre	184.00
13.4	Providing and fixing copper tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as per specification.(For vertical run)	Metre	186.00
13.5	Providing and fixing testing joint, made of 20 mm X 3 mm thick copper strip, 125 mm long, with 4 nos. of tinned brass bolts, nuts, chuck nuts and spring washers etc. complete as per specification.	Each	79.00
13.6	Providing and laying copper tape 32 mm X 6 mm from earth electrode directly in ground as per specification.	Metre	556.00
13.7	Providing and fixing of lightning conductor finial, made of 25 mm dia 300 mm long, G.I. tube, having single prong at top, with 85 mm dia 6 mm thick G.I. base plate having 4 nos holes for fixing etc. complete as per specification.	Each	271.00
13.8	Making jointing of G.I. tape (with another G I tape, base of the finial or any other metallic object) by reverting, sweating and soldering/ nut bolting of as per specification.	Each	36.00
13.9	Providing and fixing G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as per specification.(For horizontal run)	Metre	41.00
13.10	Providing and fixing G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as per specification.(For vertical run)	Metre	68.00
13.11	Providing and fixing testing joint, made of 20 mm X 3 mm thick G.I. strip, 125 mm long, with 4 nos. of G.I. bolts, nuts, chuck nuts and spring washers etc. complete as per specification.	Each	46.00
13.12	Providing and laying G.I. tape 32 mm X 6 mm from earth electrode directly in ground as per specification.	Metre	109.00
13.13	Fixing of lightning conductor finial, made of 25 mm dia 300mm long, copper tube/ G.I. tube, having single prong at top, with 85 mm dia 3mm thick copper base plate including holes etc. complete as per specification.	Each	79.00
13.14	Fixing of copper/ G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as per specification.(For horizontal run)	Metre	17.00

Code No.	Description	Unit	Rate Rs.
13.15	Fixing of copper/ G.I. tape 20 mm X 3 mm thick on parapet or surface of wall for lightning conductor complete as per specification.(For vertical run)	Metre	36.00
13.16	Laying copper/ G.I. tape 32 mm X 6 mm from earth electrode directly in ground as per specification.	Metre	22.00

CHAPTER 14 - HDPE, G.I. & RCC PIPES

(A) MATERIALS:

HDPE, G.I. RCC PIPES shall be as specified, of approved make and ISI marked only.

(B) MEASUREMENT: Linear measurement of pipe shall be made in metre correct to 1 cm

(C) RATE: Cost of all material, excavation, re-filling, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
14.1	Supplying and laying ISI marked double wall HDPE pipe (IS 14930 Part II) having corrugation on the outer wall and plan surface on inner wall in ground below road, path etc at a depth not less than 40 cm and upto 90 cm including excavation, dismantling of road if required and refilling the trench with excavated material, ramming and making the surface good etc. as per specification.		
14.1.1	63 mm outer dia and 50 mm Inner dia	Metre	156.00
14.1.2	75 mm outer dia and 60 mm Inner dia	Metre	173.00
14.1.3	90 mm outer dia and 75 mm Inner dia	Metre	173.00
14.1.4	120 mm outer dia and 103.5 mm Inner dia	Metre	215.00
14.1.5	180 mm outer dia and 152 mm Inner dia	Metre	324.00
14.1.6	200 mm outer dia and 170 mm Inner dia	Metre	437.00
14.2	Supplying and laying HDPE pipe of 4kg/Sqcm in ground below road, path etc at a depth not less than 40 cm and upto 90 cm including excavation, dismantling of road if required and refilling the trench with excavated material, ramming and making the surface good etc. as per specification.		
14.2.1	63 mm outer dia	Metre	105.00
14.2.2	75 mm outer dia	Metre	148.00
14.2.3	90 mm outer dia	Metre	208.00
14.2.4	110 mm outer dia	Metre	302.00
14.2.5	140 mm outer dia	Metre	424.00
14.2.6	160 mm outer dia	Metre	564.00
14.2.7	180 mm outer dia	Metre	669.00
14.2.8	200 mm outer dia	Metre	808.00
14.3	Supplying and laying following size medium class G.I. pipe in ground below road, path etc at a depth not less than 40 cm and upto 90 cm including excavation, dismantling of road if required and refilling the trench with excavated material, ramming and making the surface good etc. as per specification.		
14.3.1	50 mm internal dia	Metre	283.00
14.3.2	80 mm internal dia	Metre	448.00
14.3.3	100 mm internal dia	Metre	747.00

Code No.	Description	Unit	Rate Rs.
14.3.4	150 mm internal dia	Metre	1006.00
14.4	Supplying and laying following size RCC Hume pipe class NP-2 (in standard length of 2 metre) with collar in ground below road, path etc at a depth not less than 50 cm and upto 90 cm including excavation, dismantling of road if required and refilling the trench with excavated material, ramming and making the surface good etc. as per specification.		
14.4.1	100 mm dia	Metre	208.00
14.4.2	150 mm dia	Metre	236.00
14.4.3	200 mm dia	Metre	382.00
14.4.4	250 mm dia	Metre	429.00
14.4.5	300 mm dia	Metre	576.00
14.4.6	350 mm dia	Metre	690.00
14.4.7	400 mm dia	Metre	777.00
14.4.8	450 mm dia	Metre	925.00
14.4.9	500 mm dia	Metre	1103.00
14.5	Supplying and fixing G.I. pipe along with wall or pole/ support with 2 Nos MS clamps for protection of under ground cable in approved manner including bolts and nuts or metal dash fasteners complete as per specification.		
14.5.1	32 mm dia	Metre	251.00
14.5.2	40 mm dia	Metre	305.00
14.5.3	50 mm dia	Metre	343.00
14.5.4	65 mm dia	Metre	423.00
14.5.5	80 mm dia	Metre	531.00
14.5.6	100 mm dia	Metre	810.00
14.5.7	150 mm dia	Metre	1074.00

CHAPTER 15 - MV CABLE LAYING (1.1 KV)

(A) MATERIALS:

All cables shall be of approved make and ISI marked only. The bricks shall be modular well burnt clay bricks of compressive strength not less than 25kg/ sq.cm. Only fine sand shall be used.

(B) STORAGE AND HANDLING OF CABLES

- (i) The cable drums shall be stored on, hard and well drained surface, to avoid sinking of drums in the ground, causing damage to the cable drums. For long term storage of all types of cables, paved surface is preferred and protection from rain and sun is to be provided.
 - (ii) The drums shall always be stored on their flanges, and not on their flat sides.
 - (iii) Both ends of the cables should be properly sealed to prevent ingress/ absorption of moisture.
 - (iv) Ventilation should be there between cable drums.
 - (v) Damaged battens of drums etc. should be replaced at the earliest.
- Handling
- (vi) When the cable drums have to be moved over short distances, they should be rolled in the direction of the arrow marked on the drum.
 - (vii) For transportation of cable drums over long distances suitable mechanical transport should be used. If manual transportation is compulsion, the drum should be mounted on cable drum wheels, strong enough to carry the weight of the drum, and pulled by means of ropes.
 - (viii) For loading and unloading from vehicles, suitable capacity crane or a lifting tackle should be used. Small sized cable drums can also be rolled down carefully on a suitable ramp for unloading, provided no damage is likely to be caused to the cable or to the drums.

(C) ROUTE OF CABLE

Before cable laying, the route of the cable shall be decided by the Engineer-in-Charge considering the following.

- (i) The shortest practicable route should be preferred, the cable route shall generally follow fixed developments such as roads, foot paths etc. with proper offsets so that future maintenance, identification etc. are rendered easy. Cross-country run merely to shorten the route length shall not be adopted.
- (ii) Cable route shall be planned away from drains and near the property, especially in the case of LV/MV cables. Cable route should be avoided from corrosive soils, ground surrounding sewage effluent etc
- (iii) Present and likely future requirements of other services should be taken into consideration, while deciding the alignment of the cable.
- (iv) Whenever cables are laid along roads, the LV/MV cables shall be laid farther from the kerb line than HV cables.
- (v) Where available space is restricted LV/MV cables shall be laid above HV cables in vertical formation.
- (vi) Cables of different voltages, and also power and control cables shall be kept in different trenches with adequate separation Where cables cross one another, the cable of higher voltage shall be laid at a lower level than the cable of lower voltage.
- (vii) Power and communication cables shall as far as possible cross each other at right angles. The horizontal and vertical clearances between them shall not be less than 60 cm.

CHAPTER 15 - MV CABLE LAYING (1.1KV)

- (viii) Cables under railway tracks shall be laid in spun reinforced concrete, or cast iron or steel pipes at such depths as may be specified by the railway authorities, but not less than 1m, measured from the bottom of the sleepers to the top of the pipe.
Inside railway station limits, pipes shall be laid upto the point of the railway boundary or to a point to be decided by the railway authorities. Outside the railway station limits, pipes shall be laid upto a minimum distance of 3m from the center of the nearest track on either side.
- (ix) Necessary way leave for the cable route shall be obtained from appropriate authorities, such as, Municipal authorities, Department of telecommunication, Gas works, Railways, Civil Aviation authorities, Owners of properties (in case of private property) etc. and section 12/51 of the Indian Electricity Act shall be complied with.

(D) LAYING OF CABLE**GENERAL**

- (i) Cables with kinks, straightened kinks or any other apparent defects like defective armouring etc. shall not be laid.
- (ii) Cable shall not be bent sharp to a small radius, while handling or laying. The minimum safe bending radius for PVC/XLPE (MV) cables shall be 12 times the overall diameter of the cable.
- (iii) If cable is cut, the ends of cable shall be sealed with suitable sealing compound/ tape/ heat shrinkable caps immediately.
- (iv) The cables shall be tested for continuity and insulation resistance.
- (v) The cables shall be laid direct in ground, pipe, closed or open ducts, cable trays or on surface of wall etc. as specified.

UNCOILING OF CABLE BEFORE LAYING

- (i) The cable drum shall be properly mounted on jacks, or on a cable wheel of suitable capacity. The spindle should be horizontal in the bearings to prevent creeping of drum to one side while rotating.
- (ii) PVC/XLPE cables less than 120 Sqmm size may be removed by "Flaking" i.e. by making one long loop in the reverse direction.
- (iii) The cable shall be pulled over on rollers in the trench steadily and uniformly without jerks and strain. The entire cable length shall as far as possible be laid off in one stretch.
- (iv) For short runs and sizes upto 50 Sqmm of MV cables, any other suitable method of direct handling and laying can be adapted without strain or excess bending of the cables.

LAYING DIRECT IN GROUND

- (i) For laying a single cable the minimum width of the trench shall be 35 cm and the depth shall not be less than 75cm. The bottom of the trench shall be level and smooth
- (ii) Where more than one cable is to be laid in the same trench in horizontal formation, the width of the trench shall be increased such that the inter-axial spacing between the cables shall be at least 20 cm.
- (iii) In case of vertical formation of cable laying, the depth of the trench shall be increase by 30 cm for each additional vertical tier.

CHAPTER 15 - MV CABLE LAYING (1.1KV)

- (iv) There shall be a clearance of at least 15 cm between axis of the end cables and the sides of the trench.
- (v) The trenches shall be excavated in reasonably straight lines. While changing direction of trench, suitable curvature shall be adopted.
- (vi) The changes in gradients or in depth shall be gradual.
- (vii) While excavating trench, the excavated soil shall be stacked firmly by the side of the trench such that it may not fall back into the trench.
- (viii) Adequate precautions should be taken not to damage any existing cable(s), pipes or any other such installations in the route during excavation.
- (ix) Wherever bricks, tiles or protective covers or bare cables are encountered, further excavation shall not be carried out without the approval of the Engineer-in-Charge.
- (x) Existing property, if any, exposed during trenching shall be temporarily supported adequately as directed by the Engineer-in-Charge. The trenching in such cases shall be done in short lengths and necessary pipes shall be laid for passing cables therein and then the trench shall be refilled.
- (xi) Excavation through lawns shall be done in consultation with the Department concerned.

SAND CUSHIONING

- (i) The trench shall then be provided with a layer of clean, dry sand cushion of not less than 8 cm in depth, before laying the cables therein.
- (ii) Cables laid in trenches in a single tier formation shall have a covering of dry sand of not less than 17 cm above the base cushion of sand before the protective cover is laid.
- (iii) In the case of vertical multi-tier formation, after the first cable has been laid, a sand cushion of 30 cm shall be provided over the base cushion before the second tier is laid. If additional tiers are formed, each of the subsequent tiers also shall have a sand cushion of 30 cm as stated above. Cables in the top most tiers shall have final sand covering not less than 17 cm before the protective cover is laid.

LOOPS

- (i) At the time of original installation, approximately 3m of surplus cable shall be left on each terminal end of the cable and on each side of the underground joints. The surplus cable shall be left in the form of a loop. Where there are long runs of cables such loose cable may be left at suitable intervals as specified by the Engineer-in-charge.
- (ii) Where it may not be practically possible to provide separation between cables when forming loops of a number of cables, measurement shall be made only to the extent of actual volume of excavation, sand filling etc. and paid for accordingly.

PROTECTIVE COVERING

- (i) Unless otherwise specified, the cables shall be protected by brick of specified size or 20cmx10cmx10cm or locally available size, placed on top of the sand. The bricks shall be placed breadth-wise for the full length of the cable. Where more than one cable is to be laid in the same trench, one row of bricks shall be used for each cable.
- (ii) Where bricks are not easily available, or are comparatively costly, there is no objection to use locally available material such as stone tiles or slates or stone/ cement concrete slabs, where such an alternative is acceptable, the same shall be clearly specified in the tender specifications.

CHAPTER 15 - MV CABLE LAYING (1.1KV)

BACK FILLING

- (i) The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance from conductors to earth /armour and between conductors
- (ii) Insulation resistance shall be tested with a 500V megger for cables of 1.1 KV grade, or with a 2500/ 5000V megger of cables of higher voltage. Unless the insulation resistance values are satisfactory, the trench shall not be covered or filled.
- (iii) The trenches shall be then back-filled with excavated earth, free from stones or other sharp edged debris and shall be rammed and watered, if necessary in successive layers not exceeding 30 cm depth.
- (iv) A crown of earth not less than 50 mm and not exceeding 100mm in the center and tapering towards the sides of the trench shall be left to allow for subsidence unless otherwise specified. The crown of the earth however, should not exceed 10 cms so as not to be a hazard to vehicular traffic.
- (v) The temporary re-statement of roadways should be inspected at regular intervals, particularly during wet weather and settlement should be made good by further filling as may be required.
- (vi) Where it is necessary to cut road berms or displace kerb stones, the same shall be repaired and made good, except for turning/ asphaltting, to the satisfaction of the Engineer-in-Charge, and all the surplus earth or rock shall be removed to places as specified.

LAYING OF CABLE IN PIPE

- (i) In locations such as road crossing, entry in to building, paved areas etc., cables shall be laid in pipes or closed ducts. Metallic pipe shall be used as protection pipe for cables fixed on poles of overhead lines.
- (ii) GI, CI or spun reinforced concrete pipes shall be used for cables in ground, however only GI pipe shall be used as protection pipe on poles.
- (iii) The size of the pipe shall not be less than 50mm dia for a single cable and not less than 150mm for more than one cable.
- (iv) Where steel pipes are used for protection of single core cables feeding AC load, both cables in the case of single phase system and all cables in the case of poly phase system should be drawn in single pipe of sufficient dia.
- (v) Pipes for MV and HV cables shall be independent.
- (vi) In the case of new construction, pipes for present and anticipated future requirements shall be laid alongwith the civil works.
- (vii) Pipes shall be continuous and clear of debris or concrete. Sharp edges if any, at ends shall be smoothened to prevent damage to cable sheathing.
- (viii) The top surface of pipes shall be at a minimum depth of 1m from the pavement level when laid under roads, pavement etc.
- (ix) The pipes shall be laid preferable skew to reduce the angle of bend as the cable enters and leaves the crossing.
- (x) When pipes are laid by cutting and existing road, after laying the pipes the soil filled up is rammed well in layers with watering to ensure proper compaction. A crown of earth not exceeding 10 cm should be left at the top.
- (xi) The temporary re-instatements of roadways should be inspected at regular intervals upto 10 days and any settlement should be made good by further filling as may be required.
- (xii) After the subsidence has ceased, the top of the filled up trenches in roadways or other paved areas shall be restored. To the same density and material as the surrounding area in accordance with the relevant CPWD Building specifications and to the satisfaction of the Engineer-in-charge.

CHAPTER 15 - MV CABLE LAYING (1.1KV)

- (xiii) Suitable size manholes may be provided to facilitate feeding/ drawing in of cables with sufficient working space. Manhole shall be covered by suitable sizes and specified type of manhole.
- (xiv) Pipes for cable entries to the building shall slope downwards from the building. The pipes at the building end shall be suitably sealed to avoid entry of water, after the cables are laid.
- (xv) Cable-grip / draw-wires, winches etc. may be employed for drawing cables through pipes/ closed ducts.

LAYING IN OPEN DUCTS

- (i) Open ducts with suitable removable covers (RCC slabs or chequered plates) are generally provided in substations, switch rooms, plant rooms, workshops etc, for taking the cables. The cable ducts should be of suitable dimensions for the number of cables involved.
- (ii) Laying of cables with different voltage ratings in the same duct shall be avoided. Where it is compulsion to take HV & MV cables in same trench, they shall be laid with a barrier between them or alternatively, one of the two (HV or MV) cables may be taken through pipe (s).
- (iii) Joints of any type shall not be permitted inside the ducts.
- (iv) The cables shall be laid in the duct such that unnecessary crossing of cables is avoided.
- (v) Where specified, cables may be fixed with clamps on the walls of the duct or taken in hooks/ brackets/ troughs in ducts.

LAYING ON SURFACE/ CABLE TRAYS

- (i) This method may be adopted in places like switch rooms, workshops, tunnels, rising (distribution) mains in building etc. This may also be necessitated in the works of additions and/or alterations to the existing installation, where other methods of laying may not be feasible.
- (ii) Cables may be laid in surface by any of the following methods as specified:
 - (a) Directly clamped by saddles or clamps,
 - (b) Supported on cradles,
 - (c) Laid on troughs/ trays, duly clamps.
- (iii) The size and interval of metal saddle/ clamp used for fixing the cables shall be as per Table given below.

S No	Size of cable	Clamping by	Fixing intervals
1	Upto 25 Sqmm	Saddle 1mm thick	45 cm
2	35 Sqmm to 120 sq.mm	clamp 3mm thick and 25mm wide	60 cm
3	150 Sqmm and above	clamp 3mm thick and 40mm wide	60 cm

Note: The fixing intervals specified apply to straight runs. In the case of bends additional clamping shall be provided at 30 cm from the center of the bend on both sides.

- (iv) Saddles shall be secured with screws to suitable approved plugs. Clamps shall be secured with nuts on to the bolts, grouted in the supporting structure in an approved manner.
- (v) In the case of single core cables, the clamps shall be of non-magnetic material.

CHAPTER 15 - MV CABLE LAYING (1.1KV)

- (vi) Unarmored cables shall be clamped with suitable non-corrosive packing to prevent damage of the cable sheath.
- (vii) Cables shall be fixed neatly without undue sag or kinks.
- (viii) The arrangement of laying the cables in cradles is permitted only in the case of cables of 1.1KV grade of size exceeding 120 Sqmm. In such cases, the cables may be suspended on MS flat cradles of size 50mmx 5mm which in turn shall be fixed on the wall by bolts grouted into the wall in an approved manner at a spacing of not less than 60 cm.
- (ix) All MS components used in fixing the cables shall be either galvanized or given a coat of red oxide primer and finished with 2 coats of approved paint.

CABLE IDENTIFICATION TAG

Whenever more than one cable is laid/ run side by side, marker tags as approved, inscribed with cable identification details shall be permanently attached to all the cables in the manholes/ pull pits/ joint pits/ entry points in building/ open ducts etc. These shall also be attached to cables laid direct in ground at specified intervals, before the trenches are backfilled.

(C) JOINTING OF CABLES**SAFETY PRECAUTION BEFORE JOINTING**

- (i) A caution board displaying message "CAUTION CABLE JOINTING WORK IN PROGRESS" shall be displayed to warn the public and traffic where necessary.
- (iii) Before jointing is commenced, all safety precautions like isolation, discharging, earthing, display of caution board on the controlling switchgear etc. shall be taken to ensure that the cable would not be inadvertently charged from live supply.
- (iv) Metallic armour and external metallic bonding shall be connected to earth.
- (v) Where "permit to work" system is in vogue, safety procedures prescribed shall be complied with

LOCATION

- (i) Before laying a cable, most suitable locations for proposed cable joints, if any shall be decided. The water logged locations, carriage ways, pavement, proximity to telephone cables, gas or water mains, inaccessible places, ducts, pipes, racks etc. shall be avoided for locating the cable joints.
- (ii) Joints shall be staggered by 2m to 3m when joints are to be done for two or more cables laid together in the same trench.
- (iii) Joints pits shall be of sufficient dimension as to allow easy and comfortable working. The sides of the pit shall be well protected from loose earth falling into it. It shall also be covered by a tarpaulin/ PVC sheet to prevent dust and other foreign matter being blown on the exposed joint and jointing materials.
- (iv) Sufficient ventilation shall be provided during jointing operation.

JOINTING MATERIALS AND PROCEDURE

- (i) Only approved make and specified type of cable jointing kit shall be used.
- (ii) The clamps for the armour shall be clean and tight.
- (iii) Jointing as well as storing shall be done strictly as per the instructions of the manufacturer of jointing kit.

CHAPTER 15 - MV CABLE LAYING (1.1KV)

- (iv) About 3m long surplus cable shall be left on each side of joints.
- (v) Jointing work shall be carried out by a licensed/ experienced cable jointer. The sequence of cores should be so arranged as to avoid crossing of cores.
- (vi) Before jointing cable cores shall be tested for continuity, absence of cross phasing, insulation resistance from conductors to earth /armour and between conductors.
- (vii) Insulation resistance shall be tested with a 500V megger for cables of 1.1 KV grade, or with a 2500/ 5000V megger of cables of higher voltage. Unless the insulation resistance values are satisfactory, jointing shall not be done
- (viii) If oxide film is formed on aluminum conductor, it should be removed by using appropriate type of flux.

TESTING AFTER LAYING

- (i) After laying and jointing, the cable shall be subjected to a 15 minutes pressure test with 2 KV AC or 3 KV DC pressure. DC pressure testing may normally be preferred to AC pressure testing.
- (ii) Alternatively pressure test for one minute with 1000V megger for cables of 1.1 KV grade and with 2500/ 5000V megger for cables of higher voltages shall be sufficient

(D) ROUTE MARKERS

- (i) Route markers shall be provided along the runs of cables at locations approved by the Engineer-in-Charge and generally at intervals not exceeding 100m.
- (ii) Markers shall also be provided to identify change in the direction of the cable route and at locations of underground joints.
- (iii) Route markers shall be made out of 100mm x 5mm GI plate welded/ bolted on 35mmx 35mm x 6mm angle iron, 60cm long. Such plate markers shall be mounted parallel to and at about 0.5 m away from the edge of the trench.
- (iv) C.C. route marker made of cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate of 20mm in size) shall be laid flat and centered over the cable. The concrete markers, unless otherwise instructed by the Engineer-in-Charge, shall project over the surrounding surface so as to make the cable route easily identifiable.
- (v) The works' PWD-MV/HV CABLE' as the case may, shall be inscribed on the marker.

(E) MEASUREMENT:

Cable laid direct in ground, duct and surface/ cable tray shall be measured in running metre straight along trench (excluding ramble length) in running metre correct to 1 cm.

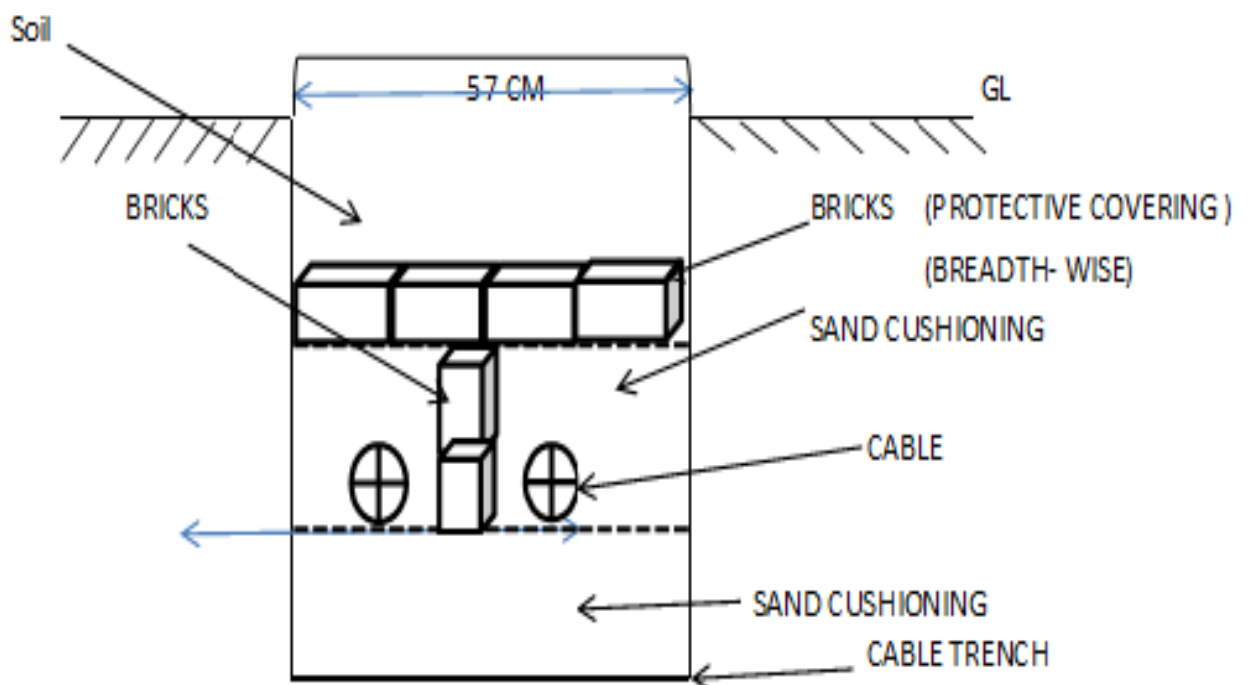
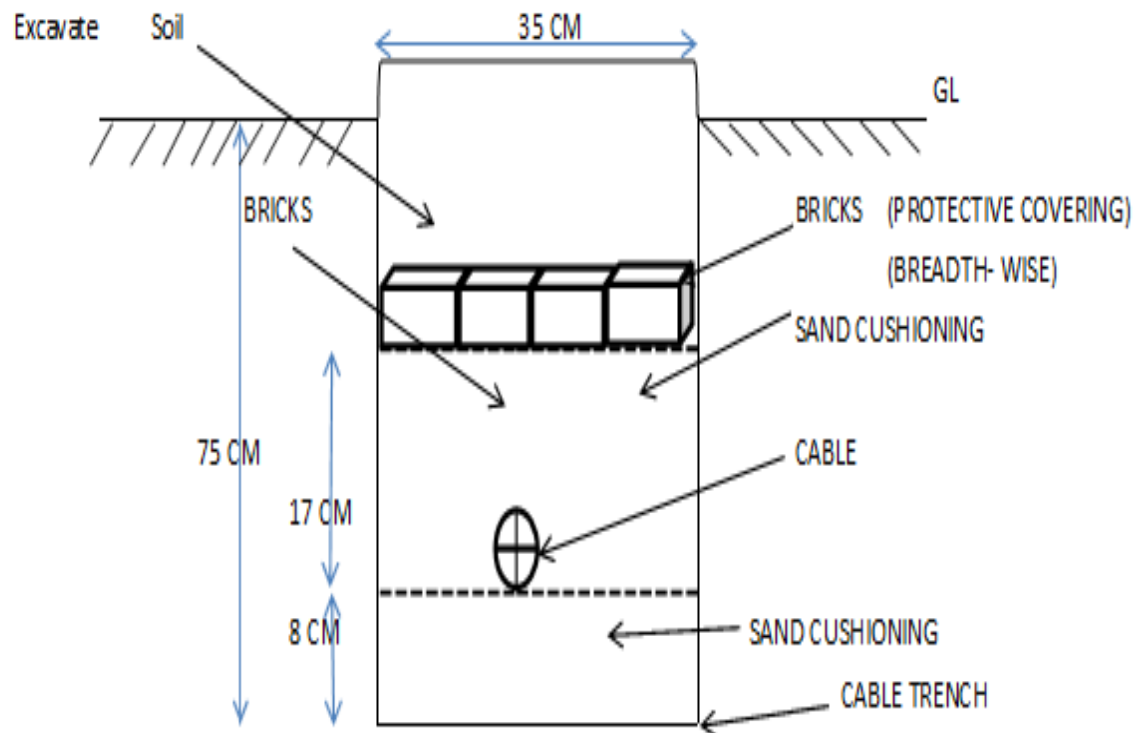
Cable laid pipes/ closed duct shall be measured in running metre correct to 1 cm taking actual length of the pipe/ duct for each run of the cable (excluding ramble length), irrespective of the length of cable drawn through it.

Cable length used in connections shall be measured as item of cable layed in open duct.

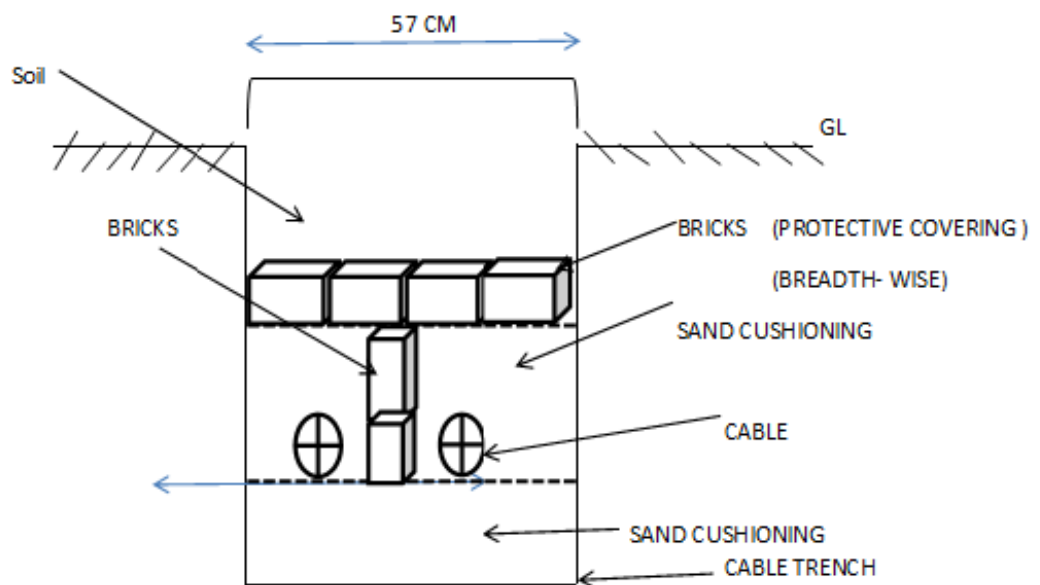
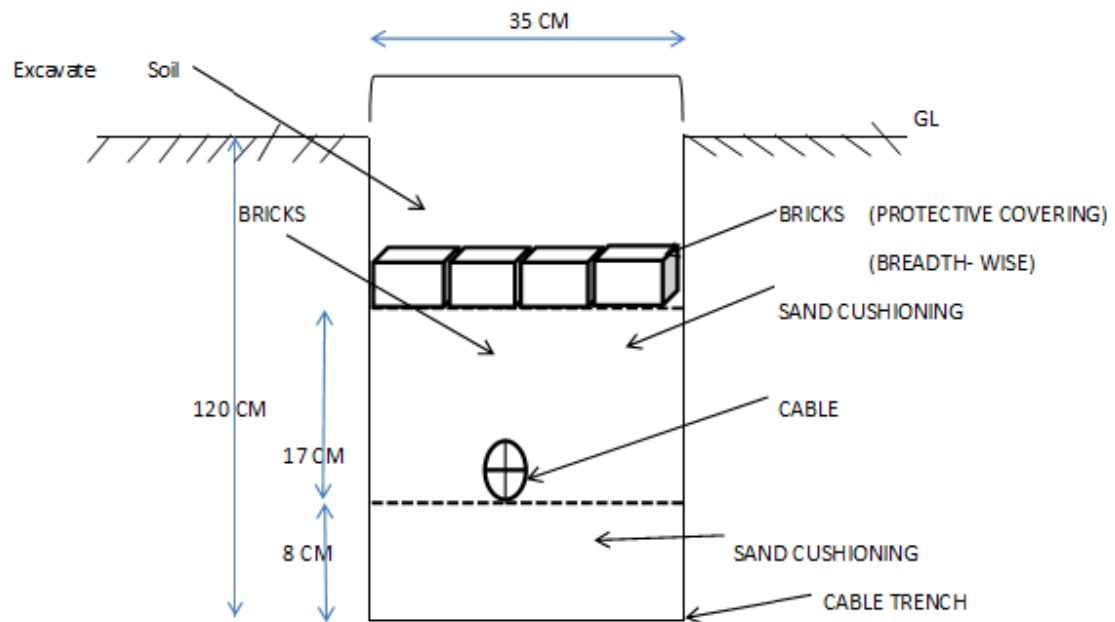
Jointing and route marker shall be counted in number.

- (H) RATE:** Cost of all material, labour and machinery used in execution of work of shall be in the cost of item.

LINE PLAN FOR LAYING OF CABLE IN DIRECT GROUND FOR LT CABLE



LINE PLAN FOR LAYING OF CABLE IN DIRECT GROUND FOR HT CABLE



NOTE :- For 33 KV Depth- 120 CM
For 11 KV Depth - 90 CM

RCC Cable Trench

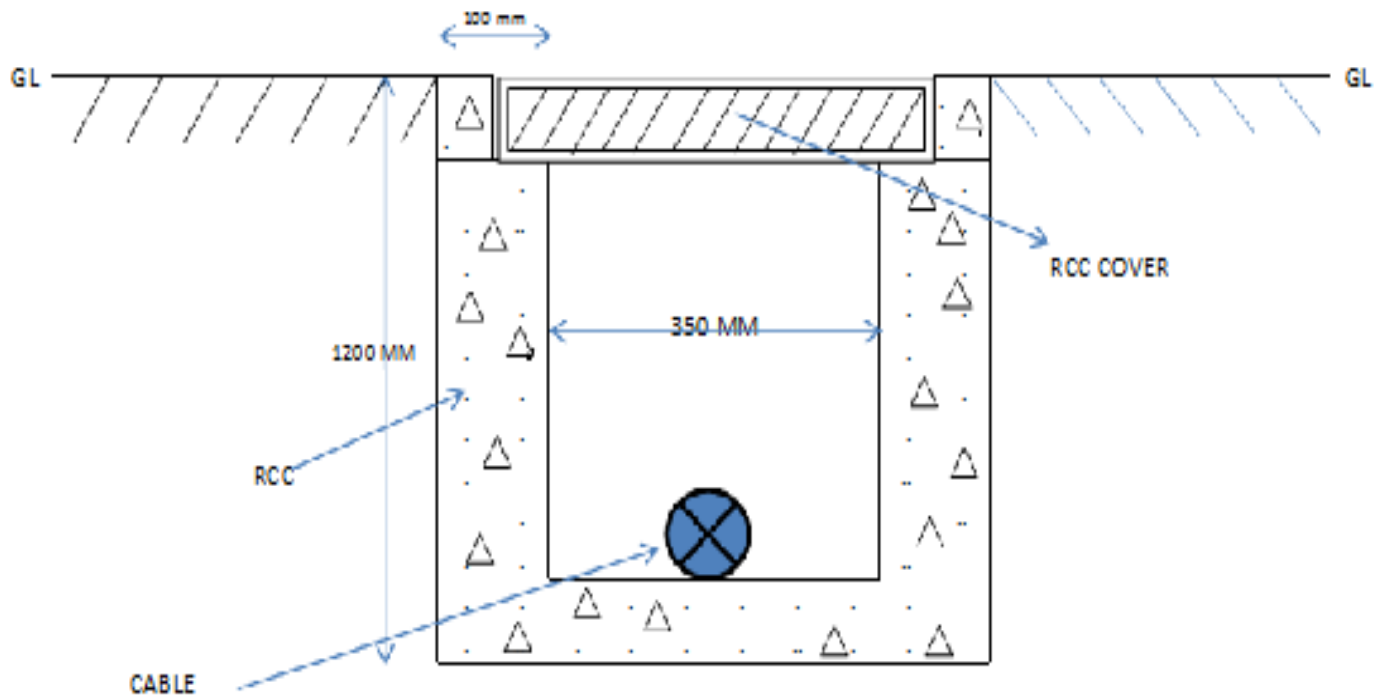


CHART SHOWING THE DISTANCE UPTO WHICH DIFFERENT SIZES OF U.G. ALUMINIUM CONDUCTOR CABLES (PVC INSULATED, PVC SHEATHED, 3 OR 4 CORE) OF GRADING 1.1 KV CAN BE USED FOR DIFFERENT CURRENT RATINGS FOR 8 VOLTS DROP WHEN LAID IN GROUND

(MAXIMUM CONDUCTOR TEMPERATURE- 70 DEGREE C)

S.No	Size in Sq.mm Current Amp	Distance in meters for the following 3/4 core 1.1 KV grade cable sizes in sq.mm.												
		6	10	16	25	35	50	70	95	120	150	185	240	300
1	5	165	260	145	725	895	1300	1925	2360	3065	3555	4300	5770	6460
2	10	80	130	205	360	450	650	960	1180	1530	1775	2150	2885	3230
3	15	55	85	140	240	300	430	640	785	1020	1185	1430	1920	2155
4	20	40	65	100	180	225	325	480	590	765	890	1075	1440	1615
5	25	30	50	80	145	180	260	385	470	610	710	860	1150	1290
6	30	25	40	70	120	150	215	320	390	570	590	715	960	1075
7	40	20	30	50	90	110	160	240	295	380	445	535	720	805
8	50	-	25	40	70	90	130	190	235	305	355	430	575	645
9	60	-	-	35	60	75	110	160	195	255	295	355	480	535
10	70	-	-	30	50	65	90	135	165	215	255	305	410	460
11	80	-	-	-	45	55	80	120	145	190	220	265	360	405
12	90	-	-	-	40	50	70	105	130	170	195	235	320	360
13	100	-	-	-	35	45	65	95	115	150	175	215	290	320
14	110	-	-	-	-	40	60	85	105	140	160	195	260	290
15	120	-	-	-	-	35	55	80	95	125	145	180	240	270
16	130	-	-	-	-	-	50	75	90	115	135	165	220	250
17	140	-	-	-	-	-	45	70	80	110	125	150	205	230
18	150	-	-	-	-	-	-	65	75	100	115	140	190	215
19	160	-	-	-	-	-	-	60	70	95	110	130	180	200
20	170	-	-	-	-	-	-	55	70	90	105	125	170	190
21	180	-	-	-	-	-	-	50	65	85	100	120	160	180
22	190	-	-	-	-	-	-	-	60	80	90	110	150	170
23	200	-	-	-	-	-	-	-	60	75	90	105	145	160
24	225	-	-	-	-	-	-	-	-	65	80	95	125	145
25	250	-	-	-	-	-	-	-	-	-	70	85	115	130
26	275	-	-	-	-	-	-	-	-	-	-	80	105	115
27	300	-	-	-	-	-	-	-	-	-	-	70	95	105

Note : In above table Ground temp is taken 15 degree C. For higher make correction as detailed below.

When the voltage drop and length is constant then to find the size of cable for following temperatures multiply the load current ratings by the following factors to obtain the calculated load current and then see the size of cable in the chart according to that ratings.

Ground Temp. :	20 Degree C	25 Degree C	30 Degree C	35 Degree C
Rating Factors:	0.95	0.90	0.85	0.80

CHAPTER 15 - MV CABLE LAYING (1.1KV)

Code No.	Description	Unit	Rate Rs.
15.1	Supplying and laying following sizes one number FRLS PVC insulated/XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade direct in ground at a depth not less than 40 cm and upto 90 cm including excavtion, sand cushioning, protective covering and refilling the trench etc as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.1.1	2 x 4 sq. mm	Metre	212.00
15.1.2	2 x 6 sq. mm	Metre	214.00
15.1.3	2 x 10 sq. mm	Metre	218.00
15.1.4	2 x 16 sq. mm	Metre	221.00
15.1.5	2 x 25 sq. mm	Metre	224.00
15.1.6	2 x 35 sq. mm	Metre	229.00
15.1.7	3 x 10 sq. mm	Metre	222.00
15.1.8	3 x 16 sq. mm	Metre	224.00
15.1.9	3 x 25 sq. mm	Metre	261.00
15.1.10	3 x 35 sq. mm	Metre	271.00
15.1.11	3.5 x 25 sq. mm.	Metre	268.00
15.1.12	3.5 x 35 sq. mm.	Metre	269.00
15.1.13	3.5 x 50 sq. mm.	Metre	315.00
15.1.14	3.5 x 70 sq. mm.	Metre	383.00
15.1.15	3.5 x 95 sq. mm.	Metre	415.00
15.1.16	3.5 x 120 sq. mm.	Metre	462.00
15.1.17	3.5 x 150 sq. mm.	Metre	573.00
15.1.18	3.5 x 185 sq. mm.	Metre	653.00
15.1.19	3.5 x 240 sq. mm.	Metre	812.00
15.1.20	3.5 x 300 sq. mm.	Metre	934.00
15.1.21	3.5 x 400 sq. mm.	Metre	1117.00
15.1.22	4 x 10 sq. mm.	Metre	249.00
15.1.23	4 x 16 sq. mm.	Metre	255.00
15.1.24	4 x 25 sq. mm.	Metre	273.00
15.2	Supplying and laying following sizes additional one number, FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade direct in ground as in the same trench in one tier horizontal formation at a depth not less than 40 cm and upto 90 cm including excavtion, sand cushioning, protective covering and refilling the trench etc as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.2.1	2 x 4 sq. mm	Metre	149.00
15.2.2	2 x 6 sq. mm	Metre	153.00
15.2.3	2 x 10 sq. mm	Metre	158.00

Code No.	Description	Unit	Rate Rs.
15.2.4	2 x 16 sq. mm	Metre	163.00
15.2.5	2 x 25 sq. mm	Metre	167.00
15.2.6	2 x 35 sq. mm	Metre	174.00
15.2.7	3 x 10 sq. mm	Metre	163.00
15.2.8	3 x 16 sq. mm	Metre	166.00
15.2.9	3 x 25 sq. mm	Metre	180.00
15.2.10	3 x 35 sq. mm	Metre	190.00
15.2.11	3.5 x 25 sq. mm.	Metre	187.00
15.2.12	3.5 x 35 sq. mm.	Metre	188.00
15.2.13	3.5 x 50 sq. mm.	Metre	231.00
15.2.14	3.5 x 70 sq. mm.	Metre	298.00
15.2.15	3.5 x 95 sq. mm.	Metre	366.00
15.2.16	3.5 x 120 sq. mm.	Metre	422.00
15.2.17	3.5 x 150 sq. mm.	Metre	482.00
15.2.18	3.5 x 185 sq. mm.	Metre	581.00
15.2.19	3.5 x 240 sq. mm.	Metre	756.00
15.2.20	3.5 x 300 sq. mm.	Metre	889.00
15.2.21	3.5 x 400 sq. mm.	Metre	1081.00
15.2.22	4 x 10 sq. mm.	Metre	168.00
15.2.23	4 x 16 sq. mm.	Metre	174.00
15.2.24	4 x 25 sq. mm.	Metre	192.00
15.3	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade in existing RCC/ HUME/ STONEWARE/ METAL/ HDPE pipe as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.3.1	2 x 4 sq. mm	Metre	59.00
15.3.2	2 x 6 sq. mm	Metre	63.00
15.3.3	2 x 10 sq. mm	Metre	70.00
15.3.4	2 x 16 sq. mm	Metre	77.00
15.3.5	2 x 25 sq. mm	Metre	77.00
15.3.6	2 x 35 sq. mm	Metre	87.00
15.3.7	3 x 10 sq. mm	Metre	76.00
15.3.8	3 x 16 sq. mm	Metre	78.00
15.3.9	3 x 25 sq. mm	Metre	91.00
15.3.10	3 x 35 sq. mm	Metre	105.00
15.3.11	3.5 x 25 sq. mm.	Metre	99.00
15.3.12	3.5 x 35 sq. mm.	Metre	114.00
15.3.13	3.5 x 50 sq. mm.	Metre	147.00
15.3.14	3.5 x 70 sq. mm.	Metre	211.00
15.3.15	3.5 x 95 sq. mm.	Metre	251.00

Code No.	Description	Unit	Rate Rs.
15.3.16	3.5 x 120 sq. mm.	Metre	324.00
15.3.17	3.5 x 150 sq. mm.	Metre	411.00
15.3.18	3.5 x 185 sq. mm.	Metre	498.00
15.3.19	3.5 x 240 sq. mm.	Metre	665.00
15.3.20	3.5 x 300 sq. mm.	Metre	800.00
15.3.21	3.5 x 400 sq. mm.	Metre	996.00
15.3.22	4 x 10 sq. mm.	Metre	81.00
15.3.23	4 x 16 sq. mm.	Metre	88.00
15.3.24	4 x 25 sq. mm.	Metre	104.00
15.4	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade in existing masonry open duct as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.4.1	2 x 4 sq. mm	Metre	52.00
15.4.2	2 x 6 sq. mm	Metre	56.00
15.4.3	2 x 10 sq. mm	Metre	63.00
15.4.4	2 x 16 sq. mm	Metre	70.00
15.4.5	2 x 25 sq. mm	Metre	70.00
15.4.6	2 x 35 sq. mm	Metre	80.00
15.4.7	3 x 10 sq. mm	Metre	69.00
15.4.8	3 x 16 sq. mm	Metre	71.00
15.4.9	3 x 25 sq. mm	Metre	83.00
15.4.10	3 x 35 sq. mm	Metre	99.00
15.4.11	3.5 x 25 sq. mm.	Metre	93.00
15.4.12	3.5 x 35 sq. mm.	Metre	107.00
15.4.13	3.5 x 50 sq. mm.	Metre	140.00
15.4.14	3.5 x 70 sq. mm.	Metre	204.00
15.4.15	3.5 x 95 sq. mm.	Metre	244.00
15.4.16	3.5 x 120 sq. mm.	Metre	316.00
15.4.17	3.5 x 150 sq. mm.	Metre	404.00
15.4.18	3.5 x 185 sq. mm.	Metre	522.00
15.4.19	3.5 x 240 sq. mm.	Metre	656.00
15.4.20	3.5 x 300 sq. mm.	Metre	839.00
15.4.21	3.5 x 400 sq. mm.	Metre	1051.00
15.4.22	4 x 10 sq. mm.	Metre	74.00
15.4.23	4 x 16 sq. mm.	Metre	80.00
15.4.24	4 x 25 sq. mm.	Metre	97.00
15.5	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade on surface/ existing cable tray with 1 mm thick GI saddle as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		

Code No.	Description	Unit	Rate Rs.
15.5.1	2 x 4 sq. mm	Metre	78.00
15.5.2	2 x 6 sq. mm	Metre	82.00
15.5.3	2 x 10 sq. mm	Metre	90.00
15.5.4	2 x 16 sq. mm	Metre	96.00
15.5.5	2 x 25 sq. mm	Metre	97.00
15.5.6	2 x 35 sq. mm	Metre	106.00
15.5.7	3 x 10 sq. mm	Metre	95.00
15.5.8	3 x 16 sq. mm	Metre	98.00
15.5.9	3 x 25 sq. mm	Metre	111.00
15.5.10	3 x 35 sq. mm	Metre	125.00
15.5.11	3.5 x 25 sq. mm.	Metre	119.00
15.5.12	3.5 x 35 sq. mm.	Metre	134.00
15.5.13	4 x 10 sq. mm.	Metre	101.00
15.5.14	4 x 16 sq. mm.	Metre	107.00
15.5.15	4 x 25 sq. mm.	Metre	124.00
15.6	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade on surface/ existing cable tray with 25x3 mm M.S flat clamp and steel dash fastener/ G.I. bolts and nuts as per specification , IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.6.1	3.5 x 50 sq. mm.	Metre	236.00
15.6.2	3.5 x 70 sq. mm.	Metre	283.00
15.6.3	3.5 x 95 sq. mm.	Metre	326.00
15.6.4	3.5 x 120 sq. mm.	Metre	382.00
15.7	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade on surface/ existing cable tray with 40x3 mm MS flat clamp and steel dash fastener/ G.I. bolts and nuts as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.7.1	3.5 x 150 sq. mm.	Metre	500.00
15.7.2	3.5 x 185 sq. mm.	Metre	592.00
15.7.3	3.5 x 240 sq. mm.	Metre	726.00
15.7.4	3.5 x 300 sq. mm.	Metre	860.00
15.7.5	3.5 x 400 sq. mm.	Metre	1059.00
15.8	Supplying and laying following sizes one number FRLS PVC insulated/ XLPE, PVC sheathed, unarmoured, aluminium conductor power cable of 1.1 KV grade on surface/ existing cable tray with 1 mm thick GI saddle as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.8.1	2 x 4 sq. mm	Metre	73.00
15.8.2	2 x 6 sq. mm	Metre	77.00
15.8.3	2 x 10 sq. mm	Metre	80.00

Code No.	Description	Unit	Rate Rs.
15.8.4	2 x 16 sq. mm	Metre	84.00
15.8.5	2 x 25 sq. mm	Metre	88.00
15.8.6	2 x 35 sq. mm	Metre	104.00
15.8.7	3 x 10 sq. mm	Metre	94.00
15.8.8	3 x 16 sq. mm	Metre	96.00
15.8.9	3 x 25 sq. mm	Metre	111.00
15.8.10	3 x 35 sq. mm	Metre	121.00
15.8.11	3.5 x 25 sq. mm.	Metre	116.00
15.8.12	3.5 x 35 sq. mm.	Metre	117.00
15.8.13	4 x 10 sq. mm.	Metre	98.00
15.8.14	4 x 16 sq. mm.	Metre	104.00
15.8.15	4 x 25 sq. mm.	Metre	122.00
15.9	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, unarmoured, aluminium conductor power cable of 1.1 KV grade on surface/ existing cable tray with 25x3 mm MS flat clamp and steel dash fastener/ G.I. bolts and nuts as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.9.1	3.5 x 50 sq. mm.	Metre	241.00
15.9.2	3.5 x 70 sq. mm.	Metre	289.00
15.9.3	3.5 x 95 sq. mm.	Metre	326.00
15.9.4	3.5 x 120 sq. mm.	Metre	381.00
15.10	Supplying and laying following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, unarmoured, aluminium conductor power cable of 1.1 KV grade on surface/ existing cable tray with 40x3 mm MS flat clamp and steel dash fastener/ G.I. bolts and nuts as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.10.1	3.5 x 150 sq. mm.	Metre	493.00
15.10.2	3.5 x 185 sq. mm.	Metre	592.00
15.10.3	3.5 x 240 sq. mm.	Metre	714.00
15.10.4	3.5 x 300 sq. mm.	Metre	845.00
15.10.5	3.5 x 400 sq. mm.	Metre	1040.00
15.11	Supplying and hanging following sizes one number FRLS PVC insulated /XLPE, PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade on GI bearer wire (binded at every metre) including cost of bearer wire complete as per specification, IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
15.11.1	2 x 4 sq. mm. on 8 SWG GI bearer wire	Metre	77.00
15.11.2	2 x 6 sq. mm. on 8 SWG GI bearer wire	Metre	81.00
15.11.3	2 x 10 sq. mm. on 8 SWG GI bearer wire	Metre	88.00
15.11.4	2 x 16 sq. mm. on 8 SWG GI bearer wire	Metre	94.00
15.11.5	2 x 25 sq. mm. on 8 SWG GI bearer wire	Metre	95.00

Code No.	Description	Unit	Rate Rs.
15.11.6	2 x 35 sq. mm. on 8 SWG GI bearer wire	Metre	104.00
15.11.7	3 x 10 sq. mm. on 8 SWG GI bearer wire	Metre	94.00
15.11.8	3 x 16 sq. mm. on 8 SWG GI bearer wire	Metre	96.00
15.11.9	3 x 25 sq. mm. on 8 SWG GI bearer wire	Metre	126.00
15.11.10	3 x 35 sq. mm. on 7 SWG GI bearer wire	Metre	146.00
15.11.11	3.5 x 25 sq. mm. on 8 SWG GI bearer wire	Metre	137.00
15.11.12	3.5 x 35 sq. mm. on 7 SWG GI bearer wire	Metre	157.00
15.11.13	3.5 x 50 sq. mm. on 6 SWG GI bearer wire	Metre	187.00
15.11.14	3.5 x 70 sq. mm. on 6 SWG GI bearer wire	Metre	233.00
15.11.15	3.5 x 95 sq. mm. on 5 SWG GI bearer wire	Metre	312.00
15.11.16	3.5 x 120 sq. mm. on 4 SWG GI bearer wire	Metre	377.00
15.11.17	3.5 x 150 sq. mm. on 4 SWG GI bearer wire	Metre	434.00
15.11.18	4 x 10 sq. mm. on 8 SWG GI bearer wire	Metre	109.00
15.11.19	4 x 16 sq. mm. on 8 SWG GI bearer wire	Metre	116.00
15.11.20	4 x 25 sq. mm. on 7 SWG GI bearer wire	Metre	137.00
15.12	Supplying and laying following sizes one number FRLS PVC insulated, PVC sheathed, steel armoured, copper conductor control /power cable of 1.1 KV grade direct in ground including sand cushioning, protective covering etc as per specification and IS: 694 (2010).		
15.12.1	2 x 1.5 sq. mm	Metre	216.00
15.12.2	4 x 1.5 sq. mm	Metre	236.00
15.12.3	6 x 1.5 sq. mm	Metre	258.00
15.12.4	4 x 10 sq. mm	Metre	387.00
15.12.5	4 x 16 sq. mm	Metre	485.00
15.12.6	4 x 25 sq. mm	Metre	691.00
15.12.7	4 x 35 sq. mm	Metre	891.00
15.12.8	4 x 50 sq. mm	Metre	1159.00
15.13	Supplying and laying following sizes one number FRLS PVC insulated, PVC sheathed, steel armoured, copper conductor control /power cable of 1.1 KV grade in exiting PVC/ GI pipe etc as per specification and IS: 694 (2010).		
15.13.1	2 x 1.5 sq. mm	Metre	80.00
15.13.2	4 x 1.5 sq. mm	Metre	100.00
15.13.3	6 x 1.5 sq. mm	Metre	122.00
15.13.4	4 x 10 sq. mm	Metre	356.00
15.13.5	4 x 16 sq. mm	Metre	454.00
15.13.6	4 x 25 sq. mm	Metre	660.00
15.13.7	4 x 35 sq. mm	Metre	860.00
15.13.8	4 x 50 sq. mm	Metre	1128.00
15.14	Supplying and laying following sizes one number FRLS PVC insulated, PVC sheathed, steel armoured, copper conductor control /power cable of		

Code No.	Description	Unit	Rate Rs.
	1.1 KV grade on surface/ existing cable tray with 1 mm thick GI saddle as per specification and IS: 694 (2010).		
15.14.1	2 x 1.5 sq. mm	Metre	95.00
15.14.2	4 x 1.5 sq. mm	Metre	113.00
15.14.3	6 x 1.5 sq. mm	Metre	133.00
15.14.4	4 x 10 sq. mm	Metre	360.00
15.14.5	4 x 16 sq. mm	Metre	459.00
15.14.6	4 x 25 sq. mm	Metre	666.00
15.14.7	4 x 35 sq. mm	Metre	865.00
15.14.8	4 x 50 sq. mm	Metre	1133.00
15.15	Supplying and laying following sizes one number FRLS PVC insulated, PVC sheathed, unarmoured, copper conductor control /power cable of 1.1 KV grade on surface/ existing cable tray with 1 mm thick GI saddle as per specification and IS: 694 (2010).		
15.15.1	2 x 1.5 sq. mm	Metre	90.00
15.15.2	4 x 1.5 sq. mm	Metre	106.00
15.15.3	6 x 1.5 sq. mm	Metre	124.00
15.15.4	4 x 10 sq. mm	Metre	349.00
15.15.5	4 x 16 sq. mm	Metre	453.00
15.15.6	4 x 25 sq. mm	Metre	634.00
15.15.7	4 x 35 sq. mm	Metre	825.00
15.15.8	4 x 50 sq. mm	Metre	1081.00
15.16	Laying of following size one number power cable of 1.1 KV grade direct in ground at a depth not less than 40 cm and upto 90 cm including excavation, sand cushioning, protective covering and refilling the trench etc as per specification.		
15.16.1	Upto 35 Sqmm	Metre	171.00
15.16.2	Above 35 Sqmm and upto 120 Sqmm	Metre	175.00
15.16.3	Above 120 Sqmm and upto 185 Sqmm	Metre	183.00
15.16.4	Above 185 Sqmm and upto 400 Sqmm	Metre	188.00
15.17	Laying of following sizes one number additional power cable of 1.1 KV grade direct in ground in the same trench in one tier horizontal formation at a depth not less than 40 cm and upto 90 cm including excavation, sand cushioning, protective covering and refilling the trench etc as per specification.		
15.17.1	Upto 35 Sqmm	Metre	110.00
15.17.2	Above 35 Sqmm and upto 120 Sqmm	Metre	121.00
15.17.3	Above 120 Sqmm and upto 185 Sqmm	Metre	131.00
15.17.4	Above 185 Sqmm and upto 400 Sqmm	Metre	141.00
15.18	Laying of following sizes one number power cable of 1.1 KV grade in existing RCC/ HUME/ STONEWARE/ METAL pipe as per specification.		

Code No.	Description	Unit	Rate Rs.
15.18.1	Upto 35 Sqmm	Metre	21.00
15.18.2	Above 35 Sqmm and upto 120 Sqmm	Metre	29.00
15.18.3	Above 120 Sqmm and upto 185 Sqmm	Metre	34.00
15.18.4	Above 185 Sqmm and upto 400 Sqmm	Metre	98.00
15.19	Laying of following sizes one number power cable of 1.1 KV grade in existing masonry open duct as per specification.		
15.19.1	Upto 35 Sqmm	Metre	18.00
15.19.2	Above 35 Sqmm and upto 120 Sqmm	Metre	23.00
15.19.3	Above 120 Sqmm and upto 185 Sqmm	Metre	31.00
15.19.4	Above 185 Sqmm and upto 400 Sqmm	Metre	37.00
15.20	Laying and fixing following sizes one number power cable of size up to 35 sq.mm and 1.1 KV grade on surface/ existing cable tray as per specification. .	Metre	43.00
15.21	Laying and fixing following sizes one number power cable of 1.1 KV grade on surface/ existing cable tray as per specification. .		
15.21.1	Upto 35 Sqmm (with 1 mm thick GI saddle)	Metre	94.00
15.21.2	Above 35 Sqmm and upto 120 Sqmm (with clamp made of 25x3mm MS flat)	Metre	94.00
15.21.3	Above 120 Sqmm and upto 185 Sqmm (with clamp made of 40x3mm MS flat)	Metre	101.00
15.21.4	Above 185 Sqmm and upto 400 Sqmm (with clamp made of 40x3mm MS flat)	Metre	110.00
15.22	Laying, binding with 14 SWG G.I. wire and hanging following sizes one number power cable of 1.1 KV grade in air with bearer wire including binding material but excluding cost of bearer wire as per specification.		
15.22.1	Upto 35 Sqmm	Metre	32.00
15.22.2	Above 35 Sqmm and upto 120 Sqmm	Metre	36.00
15.22.3	Above 120 Sqmm and upto 185 Sqmm	Metre	41.00
15.22.4	Above 185 Sqmm and upto 400 Sqmm	Metre	44.00
15.23	Supplying and making end termination with brass compression gland and aluminum lugs for following size armoured aluminum conductor power cable of 1.1 KV grade as per specification.		
15.23.1	2 X 4 sq. mm (16 mm)	Each	77.00
15.23.2	2 X 6 sq. mm (16 mm)	Each	78.00
15.23.3	2 X 10 sq. mm (19 mm)	Each	80.00
15.23.4	2 X 16 sq. mm (19 mm)	Each	81.00
15.23.5	2 X 25 sq. mm (22 mm)	Each	83.00
15.23.6	2 X 35 sq. mm (25 mm)	Each	88.00
15.23.7	2 X 50 sq. mm (25 mm)	Each	88.00
15.23.8	3 X 10 sq. mm (19 mm)	Each	81.00
15.23.9	3 X 16 sq. mm (22 mm)	Each	85.00

Code No.	Description	Unit	Rate Rs.
15.23.10	3 X 25 sq. mm (25 mm)	Each	88.00
15.23.11	3 X 35 sq. mm (25 mm)	Each	89.00
15.23.12	3½ X 25 sq. mm (25 mm)	Each	88.00
15.23.13	3½ X 35 sq. mm (28 mm)	Each	130.00
15.23.14	3½ X 50 sq. mm (32 mm)	Each	143.00
15.23.15	3½ X 70 sq. mm (35 mm)	Each	169.00
15.23.16	3½ X 95 sq. mm (38 mm)	Each	218.00
15.23.17	3½ X 120 sq. mm (45 mm)	Each	241.00
15.23.18	3½ X 150 sq. mm (45 mm)	Each	270.00
15.23.19	3½ X 185 sq. mm (50 mm)	Each	327.00
15.23.20	3½ X 240 sq. mm (57 mm)	Each	428.00
15.23.21	3½ X 300 sq. mm (63 mm)	Each	524.00
15.23.22	3½ X 400 sq. mm (70 mm)	Each	657.00
15.23.23	4 X 10 sq. mm (22 mm)	Each	83.00
15.23.24	4 X 16 sq. mm (22 mm)	Each	86.00
15.23.25	4 X 25 sq. mm (25 mm)	Each	88.00
15.23.26	4 X 35 sq. mm (28 mm)	Each	105.00
15.24	Supplying and making end termination with brass compression gland and copper lugs for following size armoured copper conductor power cable of 1.1 KV grade as per specification.		
15.24.1	2 X 4 sq. mm (16 mm)	Each	81.00
15.24.2	2 X 6 sq. mm (16 mm)	Each	82.00
15.24.3	2 X 10 sq. mm (19 mm)	Each	82.00
15.24.4	2 X 16 sq. mm (19 mm)	Each	85.00
15.24.5	2 X 25 sq. mm (22 mm)	Each	95.00
15.24.6	2 X 35 sq. mm (25 mm)	Each	99.00
15.24.7	2 X 50 sq. mm (25 mm)	Each	103.00
15.24.8	3 X 10 sq. mm (19 mm)	Each	86.00
15.24.9	3 X 16 sq. mm (22 mm)	Each	94.00
15.24.10	3 X 25 sq. mm (25 mm)	Each	112.00
15.24.11	3 X 35 sq. mm (25 mm)	Each	115.00
15.24.12	3½ X 25 sq. mm (25 mm)	Each	117.00
15.24.13	3½ X 35 sq. mm (28 mm)	Each	150.00
15.24.14	3½ X 50 sq. mm (32 mm)	Each	171.00
15.24.15	3½ X 70 sq. mm (35 mm)	Each	235.00
15.24.16	3½ X 95 sq. mm (38 mm)	Each	316.00
15.24.17	3½ X 120 sq. mm (45 mm)	Each	377.00
15.24.18	3½ X 150 sq. mm (45 mm)	Each	457.00
15.24.19	3½ X 185 sq. mm (50 mm)	Each	614.00
15.24.20	3½ X 240 sq. mm (57 mm)	Each	818.00
15.24.21	4 X 10 sq. mm (22 mm)	Each	94.00

Code No.	Description	Unit	Rate Rs.
15.24.22	4 X 16 sq. mm (22 mm)	Each	97.00
15.24.23	4 X 25 sq. mm (25 mm)	Each	139.00
15.24.24	4 X 35 sq. mm (28 mm)	Each	167.00
15.25	Supplying and making outdoor end termination with cast resin compound including aluminum lugs and other jointing materials for following size of FRLS PVC insulated and PVC sheathed / XLPE aluminum conductor power cable of 1.1 KV grade as per specification.		
15.25.1	3½ X 35 sq. mm	Each	485.00
15.25.2	3½ X 50 sq. mm	Each	567.00
15.25.3	3½ X 70 sq. mm	Each	594.00
15.25.4	3½ X 95 sq. mm	Each	645.00
15.25.5	3½ X 120 sq. mm	Each	653.00
15.25.6	3½ X 150 sq. mm	Each	811.00
15.25.7	3½ X 185 sq. mm	Each	875.00
15.25.8	3½ X 240 sq. mm	Each	1068.00
15.25.9	3½ X 300 sq. mm	Each	1189.00
15.25.10	3½ X 400 sq. mm	Each	1330.00
15.26	Supplying and making straight through joint with cast resin compound including aluminium ferrules and other jointing materials for following size of FRLS PVC insulated and PVC sheathed / XLPE aluminum conductor cable of 1.1 KV grade as per specification.		
15.26.1	2 X 10 sq. mm	Each	615.00
15.26.2	2 X 16 sq. mm	Each	683.00
15.26.3	2 X 25 sq. mm	Each	684.00
15.26.4	2 X 35 sq. mm	Each	684.00
15.26.5	2 X 50 sq. mm	Each	893.00
15.26.6	3 X 16 sq. mm	Each	684.00
15.26.7	3 X 25 sq. mm	Each	685.00
15.26.8	3 X 35 sq. mm	Each	837.00
15.26.9	3 X 50 sq. mm	Each	865.00
15.26.10	3½ X 25 sq. mm	Each	782.00
15.26.11	3½ X 35 sq. mm	Each	894.00
15.26.12	3½ X 50 sq. mm	Each	1058.00
15.26.13	3½ X 70 sq. mm	Each	1072.00
15.26.14	3½ X 95 sq. mm	Each	1237.00
15.26.15	3½ X 120 sq. mm	Each	1495.00
15.26.16	3½ X 150 sq. mm	Each	1500.00
15.26.17	3½ X 185 sq. mm	Each	1717.00
15.26.18	3½ X 240 sq. mm	Each	2152.00
15.26.19	3½ X 300 sq. mm	Each	2451.00
15.26.20	3½ X 400 sq. mm	Each	2920.00

Code No.	Description	Unit	Rate Rs.
15.26.21	4 X 16 sq. mm	Each	774.00
15.26.22	4 X 25 sq. mm	Each	838.00
15.26.23	4 X 35 sq. mm	Each	895.00
15.26.24	4 X 50 sq. mm	Each	1010.00
15.27	Supplying and making straight through joint with heat shrinkable joint kit including aluminium ferrules for following size of FRLS PVC insulated and PVC sheathed / XLPE aluminum conductor cable of 1.1 KV grade as per specification.		
15.27.1	2 X 10 sq. mm	Each	723.00
15.27.2	2 X 16 sq. mm	Each	723.00
15.27.3	2 X 25 sq. mm	Each	835.00
15.27.4	2 X 35 sq. mm	Each	836.00
15.27.5	2 X 50 sq. mm	Each	893.00
15.27.6	3 X 16 sq. mm	Each	1055.00
15.27.7	3 X 25 sq. mm	Each	1113.00
15.27.8	3 X 35 sq. mm	Each	1114.00
15.27.9	3 X 50 sq. mm	Each	1439.00
15.27.10	3 X 70 sq. mm	Each	1378.00
15.27.11	3½ X 25 sq. mm	Each	1135.00
15.27.12	3½ X 35 sq. mm	Each	1193.00
15.27.13	3½ X 50 sq. mm	Each	1616.00
15.27.14	3½ X 70 sq. mm	Each	1625.00
15.27.15	3½ X 95 sq. mm	Each	1629.00
15.27.16	3½ X 120 sq. mm	Each	2123.00
15.27.17	3½ X 150 sq. mm	Each	2131.00
15.27.18	3½ X 185 sq. mm	Each	2257.00
15.27.19	3½ X 240 sq. mm	Each	3099.00
15.27.20	3½ X 300 sq. mm	Each	3142.00
15.27.21	3½ X 400 sq. mm	Each	4726.00
15.27.22	4 X 16 sq. mm	Each	1110.00
15.27.23	4 X 25 sq. mm	Each	1223.00
15.27.24	4 X 35 sq. mm	Each	1279.00
15.27.25	4 X 50 sq. mm	Each	1618.00
15.28	Supplying, fixing and cramping suitable size and all type aluminium ferule/ lugs to following size 1.1 KV grade power cable core / lead, pressed with high pressure cramping tool including connection to switch gear/ MCCB etc as per specification.		
15.28.1	6 sq. mm	Each	15.00
15.28.2	10 sq. mm	Each	15.00
15.28.3	16 sq. mm	Each	16.00
15.28.4	25 sq. mm	Each	19.00

Code No.	Description	Unit	Rate Rs.
15.28.5	35 sq. mm	Each	17.00
15.28.6	50 sq. mm	Each	18.00
15.28.7	70 sq. mm	Each	21.00
15.28.8	95 sq. mm	Each	22.00
15.28.9	120 sq. mm	Each	26.00
15.28.10	150 sq. mm	Each	29.00
15.28.11	185 sq. mm	Each	33.00
15.28.12	240 sq. mm	Each	46.00
15.28.13	300 sq. mm	Each	60.00
15.28.14	400 sq. mm	Each	80.00
15.29	Supplying, fixing and cramping suitable size and all type Copper ferule/ lugs to following size 1.1 KV grade power cable core / lead, pressed with high pressure cramping tool including connection to switch gear/ MCCB etc as per specification.		
15.29.1	6 sq. mm	Each	18.00
15.29.2	10 sq. mm	Each	18.00
15.29.3	16 sq. mm	Each	19.00
15.29.4	25 sq. mm	Each	20.00
15.29.5	35 sq. mm	Each	26.00
15.29.6	50 sq. mm	Each	30.00
15.29.7	70 sq. mm	Each	41.00
15.29.8	95 sq. mm	Each	51.00
15.29.9	120 sq. mm	Each	63.00
15.29.10	150 sq. mm	Each	83.00
15.29.11	185 sq. mm	Each	116.00
15.29.12	240 sq. mm	Each	157.00
15.29.13	300 sq. mm	Each	205.00
15.29.14	400 sq. mm	Each	233.00
15.30	Designing & Providing of suitable RCC trench in cement concrete 1:3:6 (1 Cement : 3 coarse sand: 6 graded stone aggregate 40 mm nominal size) for laying of cable inground including excavation, steel reinforcement (minimum 35.75 kg per cum), 4" drain wall, drain cover, frame work, curing & refilling of excavated soil etc as per specification.	Cum	3225.00

CHAPTER 16 - HV CABLE LAYING (11 KV)

All specifications for HV cable laying shall be same as that of MV cable laying in chapter 15 except the following:

Depth of cable trench

Total depth of trench shall not be less than 1.2 metre in a single tier formation

SAND CUSHIONING AND PROTECTIVE COVERING

Sand cushioning and protective covering shall be invariably provided in the case of HV cables.

TESTING OF LAYING

- (A) Insulation resistance shall be tested with 2500/ 5000V megger
- (B) Pressure testing shall be done for 15 minutes with 20 KV AC pressure between conductors and with 11.5 KV AC pressure between conductor and earth or 30 KV DC pressure between conductors and with 17.5 KV DC pressure between conductor and earth.
- (C) If facility for pressure testing is not available then testing for one minute with 2500/5000V megger shall be sufficient.

Code No.	Description	Unit	Rate Rs.
16.1	Supplying and laying one number following sizes XLPE, steel armoured, aluminium conductor power cable of 11 KV grade direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as per specification and IS: 7098 (2011, Part 2).		
16.1.1	3 x 35 sq mm	Metre	723.00
16.1.2	3 x 50 sq mm	Metre	788.00
16.1.3	3 x 70 sq mm	Metre	901.00
16.1.4	3 x 95 sq mm	Metre	1037.00
16.1.5	3 x 120 sq mm	Metre	1168.00
16.1.6	3 x 150 sq mm	Metre	1293.00
16.1.7	3 x 185 sq mm	Metre	1471.00
16.1.8	3 x 240 sq mm	Metre	1731.00
16.1.9	3 x 300 sq mm	Metre	1981.00
16.1.10	3 x 400 sq mm	Metre	2437.00
16.2	Supplying and laying following sizes additional one number XLPE, steel armoured, aluminium conductor power cable of 11 KV grade direct in ground in the same trench in one tier horizontal formation including excavation, sand cushioning, protective covering and refilling the trench etc as per specification and IS: 7098 (2011, Part 2).		
16.2.1	3 x 35 sq mm	Metre	648.00
16.2.2	3 x 50 sq mm	Metre	724.00
16.2.3	3 x 70 sq mm	Metre	834.00
16.2.4	3 x 95 sq mm	Metre	976.00

Code No.	Description	Unit	Rate Rs.
16.2.5	3 x 120 sq mm	Metre	1108.00
16.2.6	3 x 150 sq mm	Metre	1223.00
16.2.7	3 x 185 sq mm	Metre	1396.00
16.2.8	3 x 240 sq mm	Metre	1662.00
16.2.9	3 x 300 sq mm	Metre	1912.00
16.2.10	3 x 400 sq mm	Metre	2366.00
16.3	Supplying and laying following sizes one number XLPE, steel armoured, aluminium conductor power cable of 11 KV grade in existing RCC/ HUME/ STONEWARE/ METAL pipe as per specification and IS: 7098 (2011, Part 2).		
16.3.1	3 x 35 sq mm	Metre	552.00
16.3.2	3 x 50 sq mm	Metre	625.00
16.3.3	3 x 70 sq mm	Metre	740.00
16.3.4	3 x 95 sq mm	Metre	873.00
16.3.5	3 x 120 sq mm	Metre	1003.00
16.3.6	3 x 150 sq mm	Metre	1128.00
16.3.7	3 x 185 sq mm	Metre	1307.00
16.3.8	3 x 240 sq mm	Metre	1568.00
16.3.9	3 x 300 sq mm	Metre	1822.00
16.3.10	3 x 400 sq mm	Metre	2272.00
16.4	Supplying and laying following sizes one number XLPE, steel armoured, aluminium conductor power cable of 11 KV grade in existing masonry open duct as per specification and IS: 7098 (2011, Part 2).		
16.4.1	3 x 35 sq mm	Metre	553.00
16.4.2	3 x 50 sq mm	Metre	624.00
16.4.3	3 x 70 sq mm	Metre	734.00
16.4.4	3 x 95 sq mm	Metre	870.00
16.4.5	3 x 120 sq mm	Metre	1001.00
16.4.6	3 x 150 sq mm	Metre	1119.00
16.4.7	3 x 185 sq mm	Metre	1306.00
16.4.8	3 x 240 sq mm	Metre	1561.00
16.4.9	3 x 300 sq mm	Metre	1808.00
16.4.10	3 x 400 sq mm	Metre	2271.00
16.5	Supplying and laying following sizes one number XLPE, steel armoured, aluminium conductor power cable of 11 KV grade on surface/ existing cable tray with G.I. saddle as per specification and IS: 7098 (2011, Part 2).		
16.5.1	3 x 35 sq mm	Metre	564.00
16.6	Supplying and laying following sizes one number, steel armoured, copper conductor XLPE power cable of 11 KV grade on surface/ existing cable tray with M.S flat clamp and steel dash fastener/ G.I. bolts and nuts as per specification and IS: 7098 (2011, Part 2).		

Code No.	Description	Unit	Rate Rs.
16.6.1	3 x 50 sq mm	Metre	700.00
16.6.2	3 x 70 sq mm	Metre	803.00
16.6.3	3 x 95 sq mm	Metre	948.00
16.6.4	3 x 120 sq mm	Metre	1075.00
16.6.5	3 x 150 sq mm	Metre	1196.00
16.6.6	3 x 185 sq mm	Metre	1378.00
16.6.7	3 x 240 sq mm	Metre	1642.00
16.6.8	3 x 300 sq mm	Metre	1888.00
16.6.9	3 x 400 sq mm	Metre	2339.00
16.7	Laying of following sizes one number power cable of 11 KV grade direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as per specification.		
16.7.1	Size not exceeding 35 sq. mm.	Metre	184.00
16.7.2	Size exceeding 35 sq. mm. but not exceeding 120 sq. mm	Metre	188.00
16.7.3	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	195.00
16.7.4	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	201.00
16.8	Laying of following sizes one number additional power cable of 11 KV grade direct in ground in the same trench in one tier horizontal formation including excavation, sand cushioning, protective covering and refilling the trench etc as per specification		
16.8.1	Size not exceeding 35 sq. mm.	Metre	119.00
16.8.2	Size exceeding 35 sq. mm. but not exceeding 120 sq. mm	Metre	126.00
16.8.3	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	129.00
16.8.4	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	134.00
16.9	Laying of following sizes one number power cable of 11 KV grade in existing RCC/ HUME/ STONEWARE/ METAL pipe as per specification		0.00
16.9.1	Size not exceeding 35 sq. mm.	Metre	22.00
16.9.2	Size exceeding 35 sq. mm. but not exceeding 120 sq. mm	Metre	26.00
16.9.3	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	31.00
16.9.4	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	88.00
16.10	Laying of following sizes one number power cable of 11 KV grade in existing masonry open duct as per specification		0.00
16.10.1	Size not exceeding 35 sq. mm.	Metre	17.00
16.10.2	Size exceeding 35 sq. mm. but not exceeding 120 sq. mm	Metre	22.00
16.10.3	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	27.00
16.10.4	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	32.00
16.11	Laying and fixing of following sizes one number power cable of 11 KV grade on surface/ existing cable tray as per specification		0.00
16.11.1	Size not exceeding 35 sq. mm.	Metre	96.00
16.11.2	Size exceeding 35 sq. mm. but not exceeding 120 sq. mm	Metre	100.00
16.11.3	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	109.00

Code No.	Description	Unit	Rate Rs.
16.11.4	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	109.00
16.12	Supplying and making INDOOR cable end jointing with heat shrinkable cable jointing kit including lugs and other jointing materials, for following size of 3 core, PILC aluminum conductor cable of 11 KV grade as per specification:		
16.12.1	35 sq. mm	Each	1403.00
16.12.2	50 sq. mm	Each	2972.00
16.12.3	70 sq. mm	Each	2976.00
16.12.4	90 sq. mm	Each	2978.00
16.12.5	120 sq. mm	Each	3232.00
16.12.6	150 sq. mm	Each	3245.00
16.12.7	185 sq. mm	Each	3269.00
16.12.8	240 sq. mm	Each	4270.00
16.12.9	300 sq. mm	Each	4314.00
16.12.10	400 sq. mm	Each	5894.00
16.13	Supplying and making OUTDOOR cable end jointing with heat shrinkable cable jointing kit including lugs and other jointing materials, for following size of 3 core, PILC aluminum conductor cable of 11 KV grade as per specification:		
16.13.1	35 sq. mm	Each	2000.00
16.13.2	50 sq. mm	Each	4383.00
16.13.3	70 sq. mm	Each	4412.00
16.13.4	90 sq. mm	Each	4390.00
16.13.5	120 sq. mm	Each	4994.00
16.13.6	150 sq. mm	Each	5004.00
16.13.7	185 sq. mm	Each	5014.00
16.13.8	240 sq. mm	Each	5724.00
16.13.9	300 sq. mm	Each	5760.00
16.13.10	400 sq. mm	Each	7086.00
16.14	Supplying and making STRAIGHT THROUGH cable jointing with heat shrinkable cable jointing kit including ferrule and other jointing materials, for following size of 3 core, PILC aluminum conductor cable of 11 KV grade as per specification:		
16.14.1	35 sq. mm	Each	4891.00
16.14.2	50 sq. mm	Each	5627.00
16.14.3	70 sq. mm	Each	5635.00
16.14.4	90 sq. mm	Each	5636.00
16.14.5	120 sq. mm	Each	6145.00
16.14.6	150 sq. mm	Each	6153.00
16.14.7	185 sq. mm	Each	6165.00
16.14.8	240 sq. mm	Each	7561.00

Code No.	Description	Unit	Rate Rs.
16.14.9	300 sq. mm	Each	7577.00
16.14.10	400 sq. mm	Each	9268.00
16.15	Supplying and making INDOOR cable end jointing with heat shrinkable cable jointing kit including lugs and other jointing materials, for following size of 3 core, XLPE aluminum conductor cable of 11 KV grade as per specification:		
16.15.1	35 sq. mm	Each	1241.00
16.15.2	50 sq. mm	Each	2980.00
16.15.3	70 sq. mm	Each	2988.00
16.15.4	90 sq. mm	Each	2990.00
16.15.5	120 sq. mm	Each	3449.00
16.15.6	150 sq. mm	Each	3459.00
16.15.7	185 sq. mm	Each	3469.00
16.15.8	240 sq. mm	Each	3682.00
16.15.9	300 sq. mm	Each	3718.00
16.15.10	400 sq. mm	Each	3976.00
16.16	Supplying and making OUTDOOR cable end jointing with heat shrinkable cable jointing kit including lugs and other jointing materials, for following size of 3 core, XLPE aluminum conductor cable of 11 KV grade as per specification:		
16.16.1	35 sq. mm	Each	1801.00
16.16.2	50 sq. mm	Each	4062.00
16.16.3	70 sq. mm	Each	4070.00
16.16.4	90 sq. mm	Each	4072.00
16.16.5	120 sq. mm	Each	4335.00
16.16.6	150 sq. mm	Each	4345.00
16.16.7	185 sq. mm	Each	4355.00
16.16.8	240 sq. mm	Each	4902.00
16.16.9	300 sq. mm	Each	4938.00
16.16.10	400 sq. mm	Each	5268.00
16.17	Supplying and making STRAIGHT THROUGH cable jointing with heat shrinkable cable jointing kit including ferrule and other jointing materials, for following size of 3 core, XLPE aluminum conductor cable of 11 KV grade as per specification:		
16.17.1	35 sq. mm	Each	5806.00
16.17.2	50 sq. mm	Each	6452.00
16.17.3	70 sq. mm	Each	6458.00
16.17.4	90 sq. mm	Each	6461.00
16.17.5	120 sq. mm	Each	8212.00
16.17.6	150 sq. mm	Each	8221.00
16.17.7	185 sq. mm	Each	8233.00

Code No.		Description	Unit	Rate Rs.
16.17.8	240 sq. mm		Each	8966.00
16.17.9	300 sq. mm		Each	9001.00
16.17.10	400 sq. mm		Each	9989.00

CHAPTER 17 - HV CABLE LAYING (33 KV)

All specifications for HV cable laying shall be same as that of MV cable laying in chapter 15 and that of HV cable laying chapter 16 except the following:

Bending of cable

Cable shall not be bent sharp to a small radius either while handling or in laying. The minimum safe bending radius for armoured PILCA/XLPE, 33 KV cables shall be 20 times the overall diameter of the cable.

Code No.	Description	Unit	Rate Rs.
17.1	Supplying and laying one number following sizes XLPE, steel armoured, aluminium conductor power cable of 33 KV grade direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as per specification and IS: 7098 (2011, Part 2).		
17.1.1	3 x 50 sq mm	Metre	1599.00
17.1.2	3 x 70 sq mm	Metre	1721.00
17.1.3	3 x 95 sq mm	Metre	1801.00
17.1.4	3 x 120 sq mm	Metre	1881.00
17.1.5	3 x 150 sq mm	Metre	2078.00
17.1.6	3 x 185 sq mm	Metre	2229.00
17.1.7	3 x 240 sq mm	Metre	2523.00
17.1.8	3 x 300 sq mm	Metre	2756.00
17.1.9	3 x 400 sq mm	Metre	3122.00
17.2	Supplying and laying following sizes additional one number XLPE, steel armoured, aluminium conductor power cable of 33 KV grade direct in ground in the same trench in one tier horizontal formation including excavation, sand cushioning, protective covering and refilling the trench etc as per specification and IS: 7098 (2011, Part 2).		
17.2.1	3 x 50 sq mm	Metre	1589.00
17.2.2	3 x 70 sq mm	Metre	1709.00
17.2.3	3 x 95 sq mm	Metre	1789.00
17.2.4	3 x 120 sq mm	Metre	1869.00
17.2.5	3 x 150 sq mm	Metre	2065.00
17.2.6	3 x 185 sq mm	Metre	2215.00
17.2.7	3 x 240 sq mm	Metre	2508.00
17.2.8	3 x 300 sq mm	Metre	2741.00
17.2.9	3 x 400 sq mm	Metre	3108.00
17.3	Supplying and laying following sizes one number XLPE, steel armoured, aluminium conductor power cable of 33 KV grade in existing RCC/ HUME/ STONEWARE/ METAL pipe as per specification and IS: 7098 (2011, Part 2).		
17.3.1	3 x 50 sq mm	Metre	1346.00

Code No.	Description	Unit	Rate Rs.
17.3.2	3 x 70 sq mm	Metre	1446.00
17.3.3	3 x 95 sq mm	Metre	1540.00
17.3.4	3 x 120 sq mm	Metre	1635.00
17.3.5	3 x 150 sq mm	Metre	1771.00
17.3.6	3 x 185 sq mm	Metre	1930.00
17.3.7	3 x 240 sq mm	Metre	2174.00
17.3.8	3 x 300 sq mm	Metre	2406.00
17.3.9	3 x 400 sq mm	Metre	2774.00
17.4	Supplying and laying following sizes one number XLPE, steel armoured, aluminium conductor power cable of 33 KV grade in existing masonry open duct as per specification and IS: 7098 (2011, Part 2).		
17.4.1	3 x 50 sq mm	Metre	1254.00
17.4.2	3 x 70 sq mm	Metre	1363.00
17.4.3	3 x 95 sq mm	Metre	1438.00
17.4.4	3 x 120 sq mm	Metre	1532.00
17.4.5	3 x 150 sq mm	Metre	1718.00
17.4.6	3 x 185 sq mm	Metre	1884.00
17.4.7	3 x 240 sq mm	Metre	2139.00
17.4.8	3 x 300 sq mm	Metre	2393.00
17.4.9	3 x 400 sq mm	Metre	2755.00
17.5	Supplying and laying following sizes one number, steel armoured, copper conductor XLPE power cable of 33 KV grade on surface/ existing cable tray with M.S flat clamp and steel dash fastener/ G.I. bolts and nuts as per specification and IS: 7098 (2011, Part 2).		
17.5.1	3 x 50 sq mm	Metre	1289.00
17.5.2	3 x 70 sq mm	Metre	1434.00
17.5.3	3 x 95 sq mm	Metre	1506.00
17.5.4	3 x 120 sq mm	Metre	1613.00
17.5.5	3 x 150 sq mm	Metre	1767.00
17.5.6	3 x 185 sq mm	Metre	1930.00
17.5.7	3 x 240 sq mm	Metre	2203.00
17.5.8	3 x 300 sq mm	Metre	2448.00
17.5.9	3 x 400 sq mm	Metre	2805.00
17.6	Laying of following sizes one number power cable of 33 KV grade direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as per specification. .		
17.6.1	Size not exceeding 120 sq. mm	Metre	226.00
17.6.2	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	229.00
17.6.3	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	235.00

Code No.	Description	Unit	Rate Rs.
17.7	Laying of following sizes one number additional power cable of 33 KV grade direct in ground in the same trench in one tier horizontal formation including excavation, sand cushioning, protective covering and refilling the trench etc as per specification		0.00
17.7.1	Size not exceeding 120 sq. mm	Metre	146.00
17.7.2	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	153.00
17.7.3	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	156.00
17.8	Laying of following sizes one number power cable of 33 KV grade in existing RCC/ HUME/ STONEWARE/ METAL pipe as per specification		0.00
17.8.1	Size not exceeding 120 sq. mm	Metre	29.00
17.8.2	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	36.00
17.8.3	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	99.00
17.9	Laying of following sizes one number power cable of 33 KV grade in existing masonry open duct as per specification.		0.00
17.9.1	Size not exceeding 120 sq. mm	Metre	29.00
17.9.2	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	36.00
17.9.3	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	43.00
17.10	Laying and fixing of following sizes one number power cable of 33 KV grade on surface/ existing cable tray as per specification.		0.00
17.10.1	Size not exceeding 120 sq. mm	Metre	108.00
17.10.2	Size exceeding 120 sq. mm. but not exceeding 185 sq. mm	Metre	123.00
17.10.3	Size exceeding 185 sq. mm. but not exceeding 400 sq. mm	Metre	123.00
17.11	Supplying and making INDOOR cable end jointing with heat shrinkable cable jointing kit including lugs and other jointing materials, for following size of 3 core, XLPE aluminum conductor cable of 33 KV grade as per specification.		
17.11.1	50 sq. mm	Each	4712.00
17.11.2	70 sq. mm	Each	4719.00
17.11.3	90 sq. mm	Each	4939.00
17.11.4	120 sq. mm	Each	4947.00
17.11.5	150 sq. mm	Each	4957.00
17.11.6	185 sq. mm	Each	7181.00
17.11.7	240 sq. mm	Each	7212.00
17.11.8	300 sq. mm	Each	8118.00
17.11.9	400 sq. mm	Each	8169.00
17.12	Supplying and making OUTDOOR cable end jointing with heat shrinkable cable jointing kit including lugs and other jointing materials, for following size of 3 core, XLPE aluminum conductor cable of 33 KV grade as per specification.		
17.12.1	50 sq. mm	Each	6538.00
17.12.2	70 sq. mm	Each	6541.00

Code No.	Description	Unit	Rate Rs.
17.12.3	90 sq. mm	Each	8276.00
17.12.4	120 sq. mm	Each	8278.00
17.12.5	150 sq. mm	Each	8282.00
17.12.6	185 sq. mm	Each	10112.00
17.12.7	240 sq. mm	Each	10146.00
17.12.8	300 sq. mm	Each	13078.00
17.12.9	400 sq. mm	Each	13133.00
17.13	Supplying and making STRAIGHT THROUGH cable jointing with heat shrinkable cable jointing kit including ferrule and other jointing materials, for following size of 3 core, XLPE aluminum conductor cable of 33 KV grade as per specification.		
17.13.1	50 sq. mm	Each	16247.00
17.13.2	70 sq. mm	Each	16251.00
17.13.3	90 sq. mm	Each	20445.00
17.13.4	120 sq. mm	Each	20449.00
17.13.5	150 sq. mm	Each	20454.00
17.13.6	185 sq. mm	Each	28301.00
17.13.7	240 sq. mm	Each	28319.00
17.13.8	300 sq. mm	Each	31185.00
17.13.9	400 sq. mm	Each	31753.00

CHAPTER 18 - CABLE TRAYS AND ROUTE MARKER

(A) APPLICATION

Cables trays may be adopted in places like indoor substations, air conditioning plant rooms, generator rooms etc., or where long horizontal runs of cables are required within the building and where it is not convenient to carry the cable in open ducts. This method is preferred where heavy sized cables or a number of cables are required to be laid. The cable trays may be either of perforated sheet type or of ladder type.

The width of the cable tray shall be chosen so as to accommodate all the cables in one tier, plus 30 to 50% additional width for future expansion. The overall width of one cable tray shall be limited to 900 mm.

(B) MATERIALS:

- (i) The cable tray shall be fabricated out of slotted/ perforated MS sheets as channel sections, single or double bended. The channel sections shall be supplied in convention lengths and assembled at site to the desired lengths. These may be galvanized or painted as specified.
- (ii) The ladder type of cable tray shall be fabricated of double bended channel section longitudinal members with single bended channel section rungs of cross members welded to the base of the longitudinal members at a center to center spacing of 250 cm.
- (iii) Where specified, ladder type cable trays may be fabricated out of 50mmx50mmx6mm (minimum) angle iron for longitudinal members, and 30mmx6mm flat for rungs.
- (iv) The jointing between the sections shall be made with coupler plates of the same material and thickness as the channel section. Two coupler plates, each of minimum 200 mm length, shall be bolted on each of the two sides of the channel section with 8 mm dia round headed bolts, nuts and washers. In order to maintain proper earth continuity bond, the paint on the contact surfaces between the coupler plates and cable tray shall be scraped and removed before the installation.
- (v) Factory fabricated bends, reducers, tee/ cross junctions, etc. shall be provided. The radius of bends, junctions etc. shall not be less than the minimum permissible radius of bending of the largest size of cable to be carries by the cable tray.
- (vi) The cable tray shall be suspended form the ceiling slab with the help of 10mm dia MS rod or 25mmx5mm flats at spacing of not more than 1.2m. Flat type suspenders may be used for channels upto 450mm width bolted to cable trays. Round suspenders shall be threaded and bolted to the cable trays or to independent support angles 50mmx50mmx5mm at the bottom end as specified. These shall be grouted to the ceiling slab at the other end through an effective means, as approved by the Engineer-in-Charge, to take the weight of the cable tray with the cables.
- (vii) The entire tray (except in the case of galvanized type) and the suspenders shall be painted with two coats of red oxide primer paint after removing the dirt and rust, and finished with two coats of spray paint of approved make synthetic enamel paint.
- (viii) The cable tray shall be bonded to the earth Terminal of the switch bonds at both ends.

CHAPTER 18 - CABLE TRAYS AND ROUTE MARKER

(C) MEASUREMENT:

The cable trays shall be measured in running metre correct to 1 cm, along the center line of the cable tray, including reducers, tees, cross joints but excluding bends which will be paid separately.

The cable tray bends and route markers shall be measurements by counting in numbers.

(D) RATE: Cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
18.1	Supplying and installing following size powder coated, perforated M.S. cable trays with perforation not more than 17.5% rigidly suspended from the ceiling with M.S. suspenders at a distance not more than 2.5 metre and near every junction/ joint etc complete as per specification.		
18.1.1	100 mm width X 50 mm depth X 1.6 mm thickness	Metre	233.00
18.1.2	150 mm width X 50 mm depth X 1.6 mm thickness	Metre	267.00
18.1.3	225 mm width X 50 mm depth X 1.6 mm thickness	Metre	319.00
18.1.4	300 mm width X 50 mm depth X 1.6 mm thickness	Metre	371.00
18.1.5	375 mm width X 50 mm depth X 2.0 mm thickness	Metre	504.00
18.1.6	450 mm width x 50 mm depth X 2.0 mm thickness	Metre	608.00
18.1.7	600 mm width X 62.5 mm depth X 2.0 mm thickness	Metre	785.00
18.1.8	750 mm width X 62.5 mm depth X 2.0 mm thickness	Metre	924.00
18.1.9	900 mm width X 62.5 mm depth X 2.0 mm thickness	Metre	1063.00
18.2	Supplying and fixing of following sizes powder coated, perforated, M.S. cable trays bends (horizontal) turning at 900 in same plane with perforation not more than 17.5% rigidly jointed with cable tray etc. complete as per specification.		
18.2.1	100 mm width X 50 mm depth X 1.6 mm thick	Each	262.00
18.2.2	150 mm width X 50 mm depth X 1.6 mm thick	Each	420.00
18.2.3	225 mm width X 50 mm depth X 1.6 mm thick	Each	570.00
18.2.4	300 mm width X 50 mm depth X 1.6 mm thick	Each	801.00
18.2.5	375 mm width X 50 mm depth X 1.6 mm thick	Each	1339.00
18.2.6	450 mm width X 50 mm depth X 1.6 mm thick	Each	1708.00
18.2.7	600 mm width X 62.5 mm depth X 2 mm thick	Each	2494.00
18.2.8	750 mm width X 62.5 mm depth X 2 mm thick	Each	3312.00
18.2.9	900 mm width X 62.5 mm depth X 2 mm thick	Each	4253.00
18.3	Supplying and fixing of following sizes vertical, powder coated, perforated, M.S. cable trays bends (vertical) turning at 900 in another plane with perforation not more than 17.5% rigidly jointed with cable tray etc. complete as per specification.		

Code No.	Description	Unit	Rate Rs.
18.3.1	100 mm widthX50 mm depthX1.6 mm thick	Each	149.00
18.3.2	150 mm widthX50 mm depthX1.6 mm thick	Each	184.00
18.3.3	225 mm widthX50 mm depthX1.6 mm thick	Each	243.00
18.3.4	300 mm widthX50 mm depthX1.6 mm thick	Each	320.00
18.3.5	375 mm widthX50 mm depthX1.6 mm thick	Each	500.00
18.3.6	450 mm widthX50 mm depthX1.6 mm thick	Each	618.00
18.3.7	600 mm widthX62.5 mm depthX2 mm thick	Each	945.00
18.3.8	750 mm widthX62.5 mm depthX2 mm thick	Each	1306.00
18.3.9	900 mm widthX62.5 mm depthX2 mm thick	Each	1637.00
18.4	Supplying and installing following size of perforated hot dipped Galvanised Iron cable tray (Galvanisation thickness not less then 50 microns) with perforation not more than 17.5% rigidly suspended from the ceiling with G.I. suspenders at a distance not more than 2.5 metre and near every junction/ joint etc complete as per specification.		
18.4.1	100 mm width X 50 mm depth X 1.6 mm thickness	Metre	286.00
18.4.2	150 mm width X 50 mm depth X 1.6 mm thickness	Metre	331.00
18.4.3	225 mm width X 50 mm depth X 1.6 mm thickness	Metre	399.00
18.4.4	300 mm width X 50 mm depth X 1.6 mm thickness	Metre	466.00
18.4.5	375 mm width X 50 mm depth X 2.0 mm thickness	Metre	641.00
18.4.6	450 mm width x 50 mm depth x 2.0 mm thickness	Metre	725.00
18.4.7	600 mm width X62.5 mm depth X 2.0 mm thickness	Metre	937.00
18.4.8	750 mm width X62.5 mm depth X 2.0 mm thickness	Metre	1106.00
18.4.9	900 mm width X62.5 mm depth X 2.0 mm thickness	Metre	1275.00
18.5	Supplying and fixing of following size of perforated hot dipped Galvanised Iron (Galvanisation thickness not less then 50 microns) cable tray "bends" (horizontal) turning at 90° in same plane with perforation not more than 17.5% rigidly jointed with cable tray etc. complete as per specification.		
18.5.1	100 mm width X 50 mm depth X 1.6 mm thick	Each	196.00
18.5.2	150 mm width X 50 mm depth X 1.6 mm thick	Each	521.00
18.5.3	225 mm width X 50 mm depth X 1.6 mm thick	Each	718.00
18.5.4	300 mm width X 50 mm depth X 1.6 mm thick	Each	952.00
18.5.5	375 mm width X 50 mm depth X 1.6 mm thick	Each	1505.00
18.5.6	450 mm width X 50 mm depth X 1.6 mm thick	Each	1924.00
18.5.7	600 mm width X 62.5 mm depth X 2 mm thick	Each	2810.00
18.5.8	750 mm width X 62.5 mm depth X 2 mm thick	Each	3738.00
18.5.9	900 mm width X 62.5 mm depth X 2 mm thick	Each	4803.00
18.6	Supplying and fixing of following size of perforated hot dipped Galvanised Iron (Galvanisation thickness not less then 50 microns) cable tray "bends" (vertical) turning at 90° in same plane with perforation not more than 17.5% rigidly jointed with cable tray etc. complete as per specification.		
18.6.1	100 mm widthX50 mm depthX1.6 mm thick	Each	200.00

Code No.	Description	Unit	Rate Rs.
18.6.2	150 mm widthX50 mm depthX1.6 mm thick	Each	249.00
18.6.3	225 mm widthX50 mm depthX1.6 mm thick	Each	326.00
18.6.4	300 mm widthX50 mm depthX1.6 mm thick	Each	416.00
18.6.5	375 mm widthX50 mm depthX1.6 mm thick	Each	626.00
18.6.6	450 mm widthX50 mm depthX1.6 mm thick	Each	780.00
18.6.7	600 mm widthX62.5 mm depthX2 mm thick	Each	1121.00
18.6.8	750 mm widthX62.5 mm depthX2 mm thick	Each	1464.00
18.6.9	900 mm widthX62.5 mm depthX2 mm thick	Each	1839.00
18.7	Supplying and making cable route marker with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) of size 60 cm X 60 cm at the bottom and 50 cm X 50 cm at the top with a thickness of 10cm including inscription duly engraved as per specification.	Each	1187.00
18.8	Supplying and fixing cable route marker with 10 cm X 10 cm X 5 mm thick G.I. plate with inscription there on, bolted /welded to 35 mm X 35 mm X 6 mm angle iron, 60 cm long and fixing the same in ground as per specification.	Each	263.00
18.9	Supplying and fixing of GI Trunking/Raceways with 120 GSM coating and made up of 1.6 mm thick steel sheet. The steel sheet is Pre Galvanized with zinc coating and is double folded and arc welded in the joints to prevent concrete seepage. The trunking is compartmentalized for provision of data, power and voice cables and has a depth of 25/38mm complete as per specification. : Raw materials complies to Indian Standards IS 277:2003.		
18.9.1	50 mm x 25 mm x 1.6 mm (1 compartment)	RMT	281.00
18.9.2	75 mm x 25 mm x 1.6 mm (1 compartment)	RMT	343.00
18.9.3	100 mm x 25 mm x 1.6 mm (1 compartment)	RMT	396.00
18.9.4	225 mm x 25 mm x 1.6 mm (3 compartments)	RMT	792.00
18.9.5	250 mm x 25 mm x 1.6 mm (3 compartments)	RMT	850.00
18.9.6	300 mm x 25 mm x 1.6 mm (3 compartments)	RMT	939.00
18.9.7	50 mm x 38 mm x 1.6 mm (1 compartment)	RMT	362.00
18.9.8	75 mm x 38 mm x 1.6 mm (1 compartment)	RMT	430.00
18.9.9	100 mm x 38 mm x 1.6 mm (1 compartment)	RMT	486.00
18.9.10	100 mm x 38 mm x 1.6 mm (2 compartment)	RMT	519.00
18.9.11	150 mm x 38 mm x 1.6 mm (2 compartments)	RMT	623.00
18.9.12	225 mm x 38 mm x 1.6 mm (3 compartments)	RMT	830.00
18.9.13	250 mm x 38 mm x 1.6 mm (3 compartments)	RMT	907.00
18.9.14	300 mm x 38 mm x 1.6 mm (3 compartments)	RMT	1058.00
18.9.15	100 mm x 38 mm x 1.6 mm (1 compartment, 2mm Thick Lid and Base 1.6 mm)	RMT	646.00
18.9.16	150 mm x 38 mm x 1.6 mm (2 compartments, 2mm Thick Lid and Base 1.6 mm)	RMT	865.00

Code No.	Description	Unit	Rate Rs.
18.9.17	225 mmx 38 mmx 1.6 mm (3 compartments, 2mm Thick Lid and Base 1.6 mm)	RMT	1080.00
18.9.18	300 mm x 38 mm x 1.6 mm (3 compartments, 2mm Thick Lid and Base 1.6 mm)	RMT	1264.00
18.10	Supplying and fixing of Underfloor GI Trunking and joint sleeves with 120 GSM coating and made up of 1.6 mm thick steel sheet. The steel sheet is Pre Galvanized with zinc coating and is double folded and arc welded in the joints to prevent concrete seepage. The trunking is compartmentalized for provision of data, power and voice cables and has a depth of 25/38mm complete as per specification. : Raw materials complies to Indian Standards IS 277:2003.		
18.10.1	50 mm x 25 mm raceway Jointing sleeves	Each	103.00
18.10.2	75 mm x 25 mm raceway Jointing sleeves	Each	107.00
18.10.3	100 mm x 25 mm raceway Jointing sleeves	Each	117.00
18.10.4	225 mm x 25 mm raceway Jointing sleeves	Each	141.00
18.10.5	250 mm x 25 mm raceway Jointing sleeves	Each	148.00
18.10.6	300 mm x 25 mm raceway Jointing sleeves	Each	162.00
18.10.7	50 mm x 38 mm raceway Jointing sleeves	Each	105.00
18.10.8	75 mm x 38 mm raceway Jointing sleeves	Each	111.00
18.10.9	100 mm x 38 mm raceway Jointing sleeves	Each	115.00
18.10.10	150 mm x 38 mm raceway Jointing sleeves	Each	129.00
18.10.11	225 mm x 38 mm raceway Jointing sleeves	Each	150.00
18.10.12	250 mm x 38 mm raceway Jointing sleeves	Each	154.00
18.10.13	300 mm x 38 mm raceway Jointing sleeves	Each	162.00
18.11	Supplying and fixing of L Shaped 2 compartment Vertical access boxes to connect the floor raceways to surface equipments. The vertical access boxes should be epoxy coated and has provision to Connect floor raceway in the bottom and other cable management products on the top side vertical.		
18.11.1	Verical access boxes to connect raceways upto 225mm	Each	1289.00
18.11.2	Vertical access boxes to connect raceways upto 300mm	Each	1473.00
18.12	Supplying and fixing of GI Junction boxes, suitable for 25/38 mm depth GI raceways. The junction boxes are made out of high pressure die cast zinc alloy complete with all accesseries such as trap lid, strong support frame, bore support studs etc. complete as per specification. Trap lid is reinforced and can with stand upto 2 tons of distributed load on the top. As per IEC 61084 Standards.		
18.12.1	150 mmx 150 mm x 60 mm - 75 mm (1 compartment)	Each	715.00
18.12.2	250 mm x 250 mm x 60 mm - 75 mm (1 compartment)	Each	961.00
18.12.3	300 mm x 300 mm x 60 mm - 75 mm (1 compartment)	Each	1413.00
18.12.4	350 mm x 350 mm x 60 mm 75 mm (1 compartment)	Each	1598.00
18.12.5	400 mm x 400 mm x 60 mm - 75 mm (1 compartment)	Each	1893.00

Code No.	Description	Unit	Rate Rs.
18.13	Supplying and fixing of Crossover boxes, suitable for 25/38 mm depth GI raceways. The crossover boxes are made out of high pressure die cast zinc alloy complete with all accesseries such as trap lid, strong support frame, bore support studs etc. Complete as per specification.The crossOver box should have in-built flyovers to segregate power, data and voice cables during distribution and routing. Trap lid is reinforced and can withstand upto 2 tons of distributed load on the top. As per IEC 61084 Standards.		
18.13.1	250 mmx 250 mm x 60 mm - 75 mm (3 compartment)	Each	1709.00
18.13.2	300 mmx 300 mm x 60 mm - 75 mm (3 compartment)	Each	2162.00
18.13.3	350 mmx 350 mm x 60 mm - 75 mm (3 compartment)	Each	2476.00
18.13.4	400 mm x 400 mm x 60 mm - 75 mm (3 compartment)	Each	2767.00
18.13.5	300mmx 300mm x 70mm - 85mm SS finish	Each	6577.00
18.13.6	350mm x 350mmx 70mm - 85mm SS finish	Each	5903.00
18.14	Supplying and fixing of Floor Access outlet boxes, manufactured from high-pressure die cast material with trap frame & trap made of robust mettalic lid. Patented screwless polyamide ratchets are provided for self adjusting of the floor box for any floor finishes. The trap cover should be provided with Electrostatic Polyester Epoxy Coating, to prevent rust accumulation.The system should have provision to accommodate three compartment trunking to run Mains Voltage & Extra Low Voltage cables. The system should have Positive Double Earthing Connections to ensure safety. There should be Provision to accommodate 25/38mm deep trunking with a Knockout of 100, 150,200,225,250mm. Load bearing capacity of 2 tons.		
18.14.1	250 mm x 250 mm x 60 mm - 75 mm metallic lid (3 compartment)	Each	3090.00
18.14.2	300 mm x 300 mm x 60 mm - 75 mm (3 compartment)	Each	3480.00
18.14.3	Access Outlet 250x250x90 -110mm 20mm recess	Each	3316.00
18.14.4	Access Outlet 350x350x90 -110mm 20mm recess	Each	4063.00
18.14.5	Access outlet 300x300x70 -85mm SS finish	Each	5903.00
18.14.6	Access Outlet Box 350x350x90-120mm SS finish	Each	6336.00
18.14.7	Raised Floor 250x250mm	Each	2401.00
18.14.8	Raised floor box 250x250x80mm SS lid	Each	3976.00
18.15	Supplying and fixing of Aluminium alloy pop up boxes on floor/desk applications. The pop up boxes should have smooth hydraulic opening with provision to mount power & data accessories. etc complete as per specification. Pop up boxes should also have base box made of steel+zinc plating with earth provision.		
18.15.1	3 module pop up box	Each	796.00
18.15.2	4 module pop up box	Each	1081.00
18.15.3	6 module pop up box	Each	1748.00

CHAPTER 19 - POLE AND POLE ERECTION

(A) SCOPE

This chapter covers the requirement for installation, testing and commissioning of overhead lines support.

(B) MATERIALS

Supports shall be any of the following types as specified.

- (i) Steel tubular poles,
- (ii) Steel rail poles,
- (iii) R.S. Joist

Supports shall be of adequate strength and conform to Rule 76 of the Indian Electricity Rules. The sizes of pole sections shall be selected in accordance with relevant IS specifications to suit the requirements of loading.

Length of supports shall be specified, so as to satisfy the relevant functional requirements like the ground clearance of lines when installed, street lighting etc.

STEEL TUBULAR POLES

- (i) Steel tubular poles shall conform to IS: 2713 (Parts 1 to 3) 1980. These shall be of seamless/ swaged and welded type in three stepped sections as specified.
- (ii) The pole shall be complete with cap and base plate.
- (iii) Unless otherwise specified, one sixth of the length of the pole plus 30cm from its base shall be coated with black bituminous paint, both internally and externally. The remaining portion of the pole shall be painted with one coat of red oxide primer on its external surface.

STEEL RAIL POLES

Steel rail poles shall conform to the standard specifications of the Indian Railways.

FABRICATED POLES

Fabricated pole shall be made from Galvanized Iron (GI) pipes or mild steel (MS) pipes (seamless or ERW) or fabricated from structural steel or steel sheet as specified.

PAINT

ISI marked paints of approved make and shade shall be used. Primer coats shall be with zinc chromate red oxide paint

(C) LOCATION OF SUPPORT

- (i) Poles shall be located strictly as per drawing and/or modified drawings or as directed by the Engineer-in-Charge. Any modifications, if required due to site conditions, then modified proposal shall be submitted to the Engineer-in-Charge for approval.
- (ii) Poles shall be located alongside roads, on the road berm, a little away from the road edge and drain.

CHAPTER 19 - POLE AND POLE ERECTION

- (iii) Pole shall not be located in front of entrance to building
- (iv) Poles shall not be located in front of entrance to building.
- (v) Street lighting poles in group housing residential colonies as far as possible, shall be located such that the entrances of the blocks are lit up.
- (vi) For street lighting poles the footpath between main road and a service lane shall be preferred. At each road junction one pole shall be located.

(D) ERECTION OF SUPPORT**Excavation for supports**

- (i) Normally $1/6^{\text{th}}$ length of the pole is buried in the ground, the depth of pit shall be in accordance to pole height. The size of the pit shall be suitable for the foundation of the supports. The pits should be excavated in the direction of the lines.
- (ii) The pit for struts shall be located at a distance of not less than 1.8m from the pole.
- (iii) The depth of pit for struts shall be such that at least 1.2m of the strut is buried in the ground and the size of the pit shall be suitable for the foundation of the struts.
- (iv) Care shall be taken to see that the minimum amount of soil is disturbed so as to take advantage of the bearing capacity of the virgin ground, (and that the pits are not oversized).
- (v) Pits shall not be left unfilled for unduly long periods so as to avoid accidents. If pits are kept open for any reason, suitable barricading and other protective measures such as caution signs, caution lights, etc. should be provided near the pits (s) to warn the public, pedestrians, vehicular traffic, till the pit is back filled and leveled.

Erection

- (i) The supports shall be correctly aligned before concreting or the back filling of the pit, as the case may be.
- (ii) All supports shall be erected over a bed of thickness 15cm and of area 0.35 Sqm of cement concrete 1:3:6 (1 cement :3 coarse sand: 6 graded stone aggregate of 40mm nominal size), laid in the excavated pit, irrespective of the provision of a base plate.
- (iii) Steel poles shall be fixed in cement concrete 1:3:6 (1 cement :3 coarse sand: 6 graded stone aggregate of 40mm nominal size) foundation from bed and upto 15 cm above ground level tapered suitably to form collar with not less than 20 cm thick all round the support.
- (iv) After concreting, the excavated earth shall be back filled and consolidated in layer not exceeding 20 cm.
- (v) Curing of foundation with collar shall be done for at least two weeks by using moist gunny bags etc. before loading the pole.

(E) NUMBERING OF SUPPORTS

All supports shall be numbered after painting as directed by the Engineer-in-Charge.

(F) MEASUREMENT:

Steel rail/ R.S. Joist pole shall be measured in full length including buried portion in metres correct to 1 cm. Rest poles and other items shall be measured by counting in numbers.

- (F) RATE:** Cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

SPECIFICATIONS OF STEEL TUBULAR POLES (SWAGED TYPE) CONFORMING TO IS :2713-1980

DESIGNATION	OVERALL LENGTH	PLANTING DEPTH	LENGTH OF SECTIONS			OUTSIDE DIAMETER AND THICKNESS OF SECTIONS			APPROX WEIGHT OF POLE	BREAKING LOAD	CRIPPING LOAD	WORKING LOAD		Load For Permanent Set Not Exceeding 13MM	Load For Temporary Deflection Of 157.5 MM
			Bottom h3	Middle h2	Top h1	BOTTOM	MIDDLE	TOP				Col 12 2	Col 11 2.5		
(1)	(2) (M)	(3) (M)	(4) (M)	(5) (M)	(6) (M)	(7) (MM)	(8) (MM)	(9) (MM)	(10) (KG.)	(11) N (KGF)	(12) N (KGF)	(13) N (KGF)	(14) N (KGF)	(15) N (KGF)	(16) N (KGF)
410 SP - 1	7.00	1.25	4.00	1.50	1.50	114.3X3.65	88.9X3.25	76.1X3.25	62	2570 (262)	1820 (186)	912 (93)	1030 (105)	1245 (127)	785 (80)
410 SP - 2	7.00	1.25	4.00	1.50	1.50	114.5X4.50	88.9X4.05	76.1X3.25	73	3100 (316)	2240 (224)	1100 (112)	1240 (126)	1510 (154)	941 (96)
410 SP - 3	7.00	1.25	4.00	1.50	1.50	114.5X5.40	88.9X4.85	76.1X3.25	85	3630 (370)	2580 (263)	1280 (131)	1450 (148)	1760 (180)	1090 (111)
410 SP - 4	7.50	1.25	4.50	1.50	1.50	114.3X3.65	88.9X3.25	76.1X3.25	67	2350 (240)	1670 (170)	1320 (135)	941 (96)	1150 (117)	627 (64)
410 SP - 5	7.50	1.25	4.50	1.50	1.50	114.5X4.50	88.9X4.05	76.1X3.25	79	2760 (281)	1960 (200)	981 (100)	1100 (112)	1340 (137)	745 (76)
410 SP - 6	7.50	1.25	4.50	1.50	1.50	114.5X5.40	88.9X4.85	76.1X3.25	93	3320 (339)	2360 (241)	1180 (120)	1330 (136)	1620 (165)	873 (89)
410 SP - 7	7.50	1.25	4.50	1.50	1.50	139.7X4.50	114.3X3.65	88.9X3.25	97	4330 (442)	3080 (314)	1540 (157)	1740 (177)	2110 (215)	1400 (143)
410 SP - 8	7.50	1.25	4.50	1.50	1.50	139.7X4.85	114.3X3.65	88.9X3.25	103	4630 (472)	3280 (335)	1650 (168)	1850 (189)	2250 (229)	1480 (151)
410 SP - 9	7.50	1.25	4.50	1.50	1.50	139.7X5.40	114.3X3.65	88.9X3.25	110	5100 (520)	3620 (369)	1810 (185)	2040 (208)	2480 (253)	1600 (163)
410 SP - 10	8.00	1.50	4.50	1.75	1.75	114.3X3.65	88.9X3.25	76.1X3.25	70	2260 (230)	1600 (163)	804 (82)	902 (92)	1100 (112)	520 (53)
410 SP - 11	8.00	1.50	4.50	1.75	1.75	114.5X4.50	88.9X4.05	76.1X3.25	83	2730 (278)	1930 (197)	971 (99)	1090 (111)	1320 (135)	618 (63)
410 SP - 12	8.00	1.50	4.50	1.75	1.75	114.5X5.40	88.9X4.85	76.1X3.25	97	3190 (325)	2270 (231)	1130 (115)	1270 (130)	1550 (158)	725 (74)
410 SP - 13	8.00	1.50	4.50	1.75	1.75	139.7X4.50	114.3X3.65	88.9X3.25	101	4160 (424)	2950 (301)	1480 (151)	1670 (170)	2020 (206)	1180 (120)
410 SP - 14	8.00	1.50	4.50	1.75	1.75	139.7X4.85	114.3X4.50	88.9X3.25	111	4440 (453)	3160 (322)	1580 (161)	1770 (181)	2160 (220)	1280 (131)
410 SP - 15	8.00	1.50	4.50	1.75	1.75	139.7X5.40	114.3X4.50	88.9X3.25	119	4890 (499)	3470 (354)	1740 (177)	1960 (200)	2380 (243)	1380 (140)
410 SP - 16	8.50	1.50	5.00	1.75	1.75	114.3X3.65	88.9X3.25	76.1X3.25	75	2090 (213)	1480 (151)	745 (76)	834 (85)	1020 (104)	432 (44)
410 SP - 17	8.50	1.50	5.00	1.75	1.75	114.5X4.50	88.9X4.05	76.1X3.25	89	2520 (257)	1790 (182)	893 (91)	1010 (103)	1230 (125)	510 (52)
410 SP - 18	8.50	1.50	5.00	1.75	1.75	114.5X5.40	88.9X4.85	76.1X3.25	104	2950 (301)	2100 (214)	1050 (107)	1180 (120)	1430 (146)	598 (61)
410 SP - 19	8.50	1.50	5.00	1.75	1.75	139.7X4.50	114.3X3.65	88.9X3.25	109	3844 (392)	2730 (278)	1360 (139)	1540 (157)	1800 (191)	961 (98)
410 SP - 20	8.50	1.50	5.00	1.75	1.75	139.7X4.85	114.3X3.65	88.9X3.25	115	4110 (419)	2910 (297)	1460 (149)	1650 (168)	2000 (204)	1010 (103)
410 SP - 21	8.50	1.50	5.00	1.75	1.75	139.7X5.40	114.3X4.50	88.9X3.25	129	4530 (462)	3220 (328)	1620 (164)	1810 (185)	2210 (225)	1130 (115)
410 SP - 22	8.50	1.50	5.00	1.75	1.75	165.1X4.50	139.7X4.50	114.3X3.65	141	5450 (556)	3870 (395)	1930 (197)	2180 (222)	2650 (270)	1730 (176)
410 SP - 23	8.50	1.50	5.00	1.75	1.75	165.1X4.85	139.7X4.50	114.3X3.65	148	5840 (596)	4150 (423)	2080 (212)	2330 (238)	2840 (290)	1820 (186)
410 SP - 24	8.50	1.50	5.00	1.75	1.75	165.1X5.40	139.7X4.50	114.3X3.65	158	6450 (658)	4580 (467)	2340 (234)	2579 (263)	3140 (320)	1970 (201)
410 SP - 25	9.00	1.50	5.00	2.00	2.00	114.3X3.65	88.9X3.25	76.1X3.25	78	1940 (198)	1380 (141)	686 (70)	775 (79)	941 (96)	333 (34)
410 SP - 26	9.00	1.50	5.00	2.00	2.00	114.5X4.50	88.9X4.05	76.1X3.25	92	2340 (239)	1670 (170)	834 (85)	941 (96)	1140 (116)	402 (41)
410 SP - 27	9.00	1.50	5.00	2.00	2.00	114.5X5.40	88.9X4.85	76.1X3.25	108	2750 (280)	1950 (199)	971 (99)	1100 (112)	1330 (136)	461 (47)
410 SP - 28	9.00	1.50	5.00	2.00	2.00	139.7X4.50	114.3X3.65	88.9X3.25	113	3580 (365)	2540 (259)	1270 (130)	1430 (146)	1740 (177)	745 (76)
410 SP - 29	9.00	1.50	5.00	2.00	2.00	139.7X4.85	114.3X4.50	88.9X3.25	125	3820 (390)	2720 (277)	1350 (138)	1530 (156)	1860 (190)	814 (83)

DESIGNATION	OVERALL LENGTH	PLANTING DEPTH	LENGTH OF SECTIONS			OUTSIDE DIAMETER AND THICKNESS OF SECTIONS			APPROX WEIGHT OF POLE	BREAKING LOAD	CRIPPING LOAD	WORKING LOAD		Load For Permanent Set Not Exceeding 13MM	Load For Temporary Deflection Of 157.5 MM
			Bottom h3	Middle h2	Top h1	BOTTOM	MIDDLE	TOP				Col 12 2	Col 11 2.5		
(1)	(2) (M)	(3) (M)	(4) (M)	(5) (M)	(6) (M)	(7) (MM)	(8) (MM)	(9) (MM)	(10) (KG.)	(11) N (KGF)	(12) N (KGF)	(13) N (KGF)	(14) N (KGF)	(15) N (KGF)	(16) N (KGF)
410 SP - 30	9.00	1.50	5.00	2.00	2.00	139.7X5.40	114.3X4.50	88.9X3.25	133	4220 (430)	2990 (305)	1500 (153)	1690 (172)	2050 (209)	882 (90)
410 SP - 31	9.00	1.50	5.00	2.00	2.00	165.1X4.50	139.7X4.50	114.3X3.65	147	5070 (517)	3600 (367)	1800 (184)	2030 (207)	2460 (251)	1360 (139)
410 SP - 32	9.00	1.50	5.00	2.00	2.00	165.1X4.85	139.7X4.50	114.3X3.65	154	5430 (554)	3850 (393)	1930 (197)	2180 (222)	2640 (269)	1430 (146)
410 SP - 33	9.00	1.50	5.00	2.00	2.00	165.1X5.40	139.7X4.50	114.3X3.65	164	6000 (612)	4270 (435)	2130 (217)	2410 (245)	2910 (297)	1540 (157)
410 SP - 34	9.50	1.80	5.00	2.25	2.25	139.7X4.50	114.3X4.50	88.9X3.25	122	3630 (370)	2580 (263)	1280 (131)	1450 (148)	1760 (180)	745 (76)
410 SP - 35	9.50	1.80	5.00	2.25	2.25	139.7X4.85	114.3X4.50	88.9X3.25	129	3880 (396)	2760 (281)	1390 (142)	1550 (158)	1880 (192)	784 (80)
410 SP - 36	9.50	1.80	5.00	2.25	2.25	139.7X5.40	114.3X4.50	88.9X3.25	137	4280 (436)	3040 (310)	1520 (155)	1710 (174)	2080 (212)	833 (85)
410 SP - 37	9.50	1.80	5.00	2.25	2.25	165.1X4.50	139.7X4.50	114.3X3.65	153	5150 (525)	3660 (373)	1820 (186)	2060 (210)	2500 (255)	1300 (133)
410 SP - 38	9.50	1.80	5.00	2.25	2.25	165.1X4.85	139.7X4.50	114.3X3.65	160	5510 (562)	3910 (399)	1960 (200)	2210 (225)	2680 (273)	1370 (140)
410 SP - 39	9.50	1.80	5.00	2.25	2.25	165.1X5.40	139.7X4.50	114.3X3.65	170	6090 (621)	4320 (441)	2160 (220)	2430 (248)	2960 (302)	1480 (151)
410 SP - 40	10.00	1.80	5.20	2.40	2.40	139.7X4.50	114.3X4.50	88.9X3.25	128	3390 (346)	2410 (246)	1210 (123)	1350 (138)	1650 (168)	608 (62)
410 SP - 41	10.00	1.80	5.20	2.40	2.40	139.7x4.85	114.3x4.50	88.9x3.25	135	3630 (370)	2580 (263)	1280 (131)	1450 (148)	1760 (180)	637 (65)
410 SP - 42	10.00	1.80	5.20	2.40	2.40	139.7x5.40	114.3x4.50	88.9x3.25	144	3990 (407)	2830 (289)	1410 (144)	1600 (163)	1940 (198)	677 (69)
410 SP - 43	10.00	1.80	5.20	2.40	2.40	165.1x4.50	139.7x4.50	114.3x3.65	160	4810 (490)	3410 (348)	1710 (174)	1920 (196)	2330 (238)	1060 (108)
410 SP - 44	10.00	1.80	5.20	2.40	2.40	165.1x4.85	139.7x4.50	114.3x3.65	168	5150 (525)	3660 (373)	1820 (186)	2060 (210)	2500 (255)	1120 (114)
410 SP - 45	10.00	1.80	5.20	2.40	2.40	165.1x5.40	139.7x4.50	114.3x3.65	178	5690 (580)	4040 (412)	2020 (206)	2280 (232)	2760 (282)	1200 (122)
410 SP - 46	10.00	1.80	5.20	2.40	2.40	193.7x4.85	165.1x4.50	139.7x4.50	208	7210 (735)	5120 (522)	2560 (261)	2880 (294)	3500 (357)	1850 (189)
410 SP - 47	10.00	1.80	5.20	2.40	2.40	193.7x5.40	165.1x4.50	139.7x4.50	221	7910 (807)	5620 (573)	2800 (286)	3170 (323)	3840 (392)	1990 (203)
410 SP - 48	10.00	1.80	5.20	2.40	2.40	193.7x5.90	165.1x4.50	139.7x4.50	233	8620 (879)	6120 (624)	3060 (312)	3450 (352)	4190 (427)	2110 (215)
410 SP - 49	11.00	1.80	5.60	2.70	2.70	139.7x4.85	114.3x4.50	88.9x3.25	140	3000 (306)	2130 (217)	1070 (109)	1200 (122)	1460 (149)	412 (42)
410 SP - 50	11.00	1.80	5.60	2.70	2.70	139.7x5.40	114.3x4.50	88.9x3.25	147	3210 (327)	2280 (232)	1140 (116)	1280 (131)	1560 (159)	431 (44)
410 SP - 51	11.00	1.80	5.60	2.70	2.70	139.7x5.40	114.3x5.40	88.9x3.25	164	3530 (360)	2510 (256)	1260 (128)	1410 (144)	1720 (175)	480 (49)
410 SP - 52	11.00	1.80	5.60	2.70	2.70	165.1x4.50	139.7x4.50	114.3x3.65	175	4250 (433)	3010 (307)	1510 (154)	1700 (173)	2060 (210)	726 (74)
410 SP - 53	11.00	1.80	5.60	2.70	2.70	165.1x4.85	139.7x4.50	114.3x3.65	183	4550 (464)	3230 (329)	1620 (165)	1820 (186)	2220 (226)	765 (78)
410 SP - 54	11.00	1.80	5.60	2.70	2.70	165.1x5.40	139.7x4.50	114.3x3.65	194	5030 (513)	3570 (364)	1780 (182)	2010 (205)	2440 (249)	814 (83)
410 SP - 55	11.00	1.80	5.60	2.70	2.70	193.7x4.85	165.1x4.50	139.7x4.50	227	6370 (650)	4530 (462)	2260 (231)	2350 (260)	3100 (316)	1270 (130)
410 SP - 56	11.00	1.80	5.60	2.70	2.70	193.7x5.40	165.1x4.50	139.7x4.50	241	6990 (713)	4920 (502)	2480 (253)	2790 (285)	3400 (347)	1370 (140)
410 SP - 57	11.00	1.80	5.60	2.70	2.70	193.7x5.90	165.1x4.85	139.7x4.50	256	7620 (777)	5410 (552)	2710 (276)	3050 (311)	3710 (378)	1470 (150)
410 SP - 58	12.00	2.00	5.80	3.10	3.10	165.1x4.50	139.7x4.50	114.3x3.65	186	3880 (396)	2760 (281)	1380 (141)	1550 (158)	1880 (192)	539 (55)
410 SP - 59	12.00	2.00	5.80	3.10	3.10	165.1x4.85	139.7x4.50	114.3x3.65	197	4160 (424)	2950 (301)	1480 (151)	1670 (170)	2020 (206)	569 (58)
410 SP - 60	12.00	2.00	5.80	3.10	3.10	165.1x5.40	139.7x4.50	114.3x3.65	208	4600 (469)	3270 (333)	1630 (166)	1840 (188)	2240 (228)	598 (61)

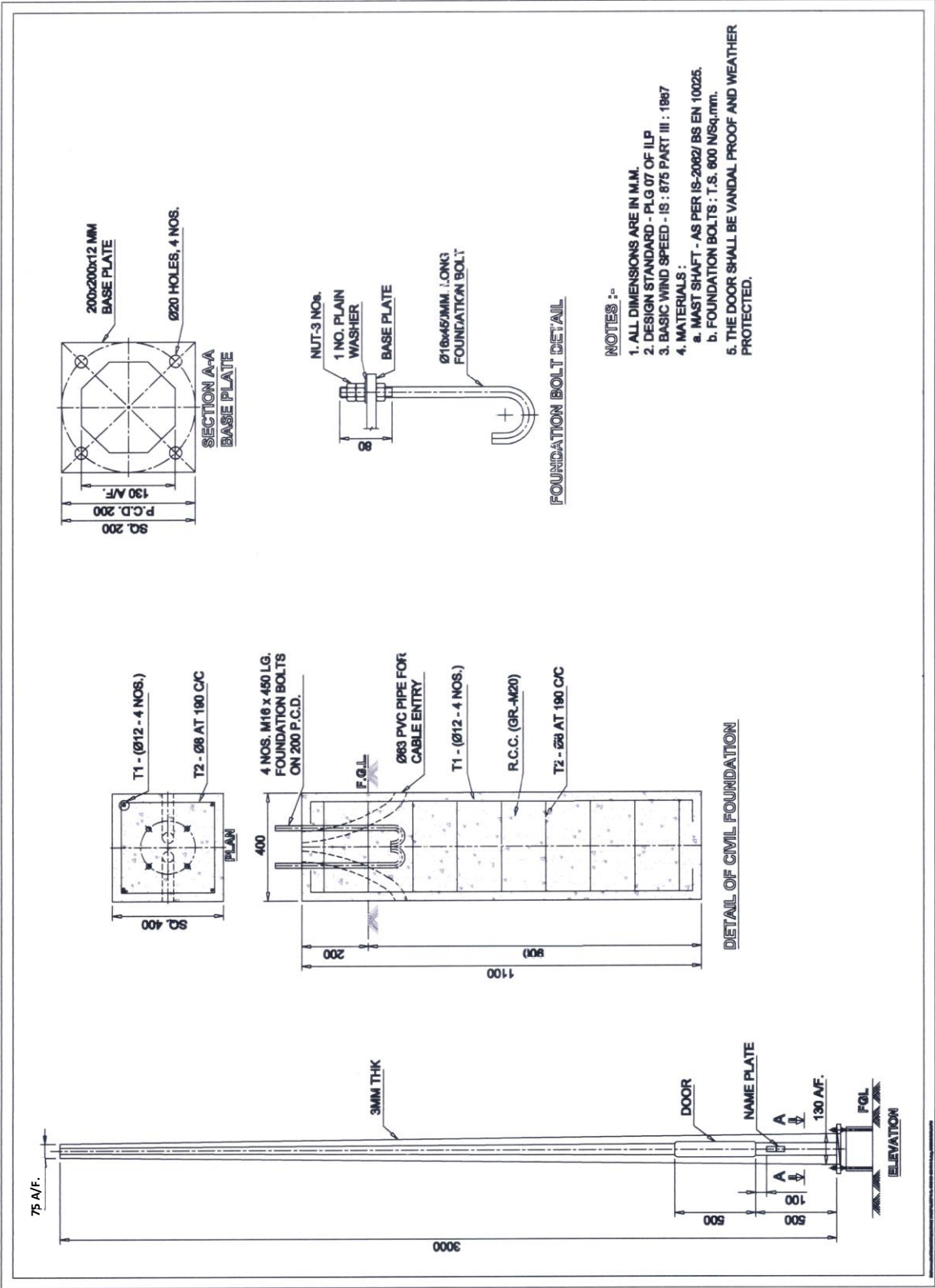
DESIGNATION	OVERALL LENGTH	PLANTING DEPTH	LENGTH OF SECTIONS			OUTSIDE DIAMETER AND THICKNESS OF SECTIONS			APPROX WEIGHT OF POLE	BREAKING LOAD	CRIPPLING LOAD	WORKING LOAD		Load For Permanent Set Not Exceeding 13MM	Load For Temporary Deflection Of 157.5 MM
			Bottom h3	Middle h2	Top h1	BOTTOM	MIDDLE	TOP				Col 12 2	Col 11 2.5		
(1)	(2) (M)	(3) (M)	(4) (M)	(5) (M)	(6) (M)	(7) (MM)	(8) (MM)	(9) (MM)	(10) (KG.)	(11) N (KGF)	(12) N (KGF)	(13) N (KGF)	(14) N (KGF)	(15) N (KGF)	(16) N (KGF)
410 SP - 61	12.00	2.00	5.80	3.10	3.10	193.7x4.85	165.1x4.50	139.7x4.50	245	5820 (594)	4140 (422)	2070 (211)	2330 (238)	2830 (289)	951 (97)
410 SP - 62	12.00	2.00	5.80	3.10	3.10	193.7x5.40	165.1x4.50	139.7x4.50	259	6390 (652)	4540 (463)	2270 (231)	2360 (261)	3110 (317)	1010 (103)
410 SP - 63	12.00	2.00	5.80	3.10	3.10	193.7x5.90	165.1x4.85	139.7x4.50	277	6960 (710)	4940 (504)	2470 (252)	2790 (284)	3390 (345)	1090 (111)
410 SP - 64	12.00	2.00	5.80	3.10	3.10	219.1x4.85	193.7x4.85	165.1x4.50	292	7490 (764)	5320 (542)	2660 (271)	3000 (306)	3640 (371)	1460 (149)
410 SP - 65	12.00	2.00	5.80	3.10	3.10	219.1x5.60	193.7x4.85	165.1x4.50	313	8530 (871)	6060 (618)	3030 (309)	3410 (348)	4150 (423)	1610 (164)
410 SP - 66	12.00	2.00	5.80	3.10	3.10	219.1x5.90	193.7x4.85	165.1x4.50	322	8980 (916)	6370 (650)	3190 (325)	3590 (366)	4360 (445)	1660 (169)
410 SP - 67	13.00	2.00	5.80	3.60	3.60	193.7x4.85	165.1x4.50	139.7x4.50	261	5270 (537)	3740 (381)	1870 (191)	2110 (215)	2560 (261)	677 (69)
410 SP - 68	13.00	2.00	5.80	3.60	3.60	193.7x5.40	165.1x4.85	139.7x4.50	281	5790 (590)	4110 (419)	2050 (209)	2310 (236)	2810 (287)	735 (75)
410 SP - 69	13.00	2.00	5.80	3.60	3.60	193.7x5.90	165.1x5.40	139.7x4.50	302	6300 (642)	4470 (456)	2240 (228)	2520 (257)	3060 (312)	794 (81)
410 SP - 70	13.00	2.00	5.80	3.60	3.60	219.1x4.85	193.7x4.85	165.1x4.50	312	6780 (691)	4820 (491)	2400 (245)	2710 (276)	3300 (336)	1060 (108)
410 SP - 71	13.00	2.00	5.80	3.60	3.60	219.1x5.60	193.7x4.85	165.1x4.50	333	7720 (787)	5480 (559)	2740 (279)	3090 (315)	3750 (382)	1160 (118)
410 SP - 72	13.00	2.00	5.80	3.60	3.60	219.1x5.90	193.7x4.85	165.1x4.50	343	8120 (828)	5770 (588)	2880 (294)	3250 (331)	3940 (402)	1190 (121)
410 SP - 73	14.50	2.00	6.50	4.00	4.00	193.7x5.40	165.1x5.40	139.7x4.50	341	5050 (515)	3590 (366)	1790 (183)	2020 (206)	2450 (250)	500 (51)
410 SP - 74	14.50	2.00	6.50	4.00	4.00	193.7x5.90	193.7x4.85	139.7x4.50	367	5500 (561)	3900 (398)	1950 (199)	2200 (224)	2680 (273)	539 (55)
410 SP - 75	14.50	2.00	6.50	4.00	4.00	219.1x5.60	193.7x4.85	165.1x4.50	405	6750 (688)	4790 (488)	2390 (244)	2700 (275)	3780 (384)	775 (79)
410 SP - 76	14.50	2.00	6.50	4.00	4.00	219.1x5.90	193.7x4.85	165.1x4.50	416	7100 (724)	5040 (514)	2520 (257)	2840 (290)	3450 (352)	794 (81)
410 SP - 77	16.00	2.30	7.00	4.50	4.50	193.7x5.40	165.1x5.40	139.7x4.50	153	4590 (468)	3260 (332)	1630 (166)	1830 (187)	2230 (227)	363 (37)
410 SP - 78	16.00	2.30	7.00	4.50	4.50	193.7x5.90	193.7x4.85	139.7x4.50	160	5000 (510)	3550 (362)	1780 (181)	2000 (204)	2430 (248)	392 (40)
410 SP - 79	16.00	2.30	7.00	4.50	4.50	219.1x5.60	193.7x4.85	165.1x4.50	170	6130 (625)	4350 (444)	2180 (222)	2450 (250)	2980 (304)	569 (58)
410 SP - 80	16.00	2.30	7.00	4.50	4.50	219.1x5.90	193.7x4.85	165.1x4.50	128	6440 (657)	4570 (466)	2280 (233)	2580 (263)	3130 (319)	588 (60)

Note:-1 Based on assumption that steel weights 7.85 g/cm³

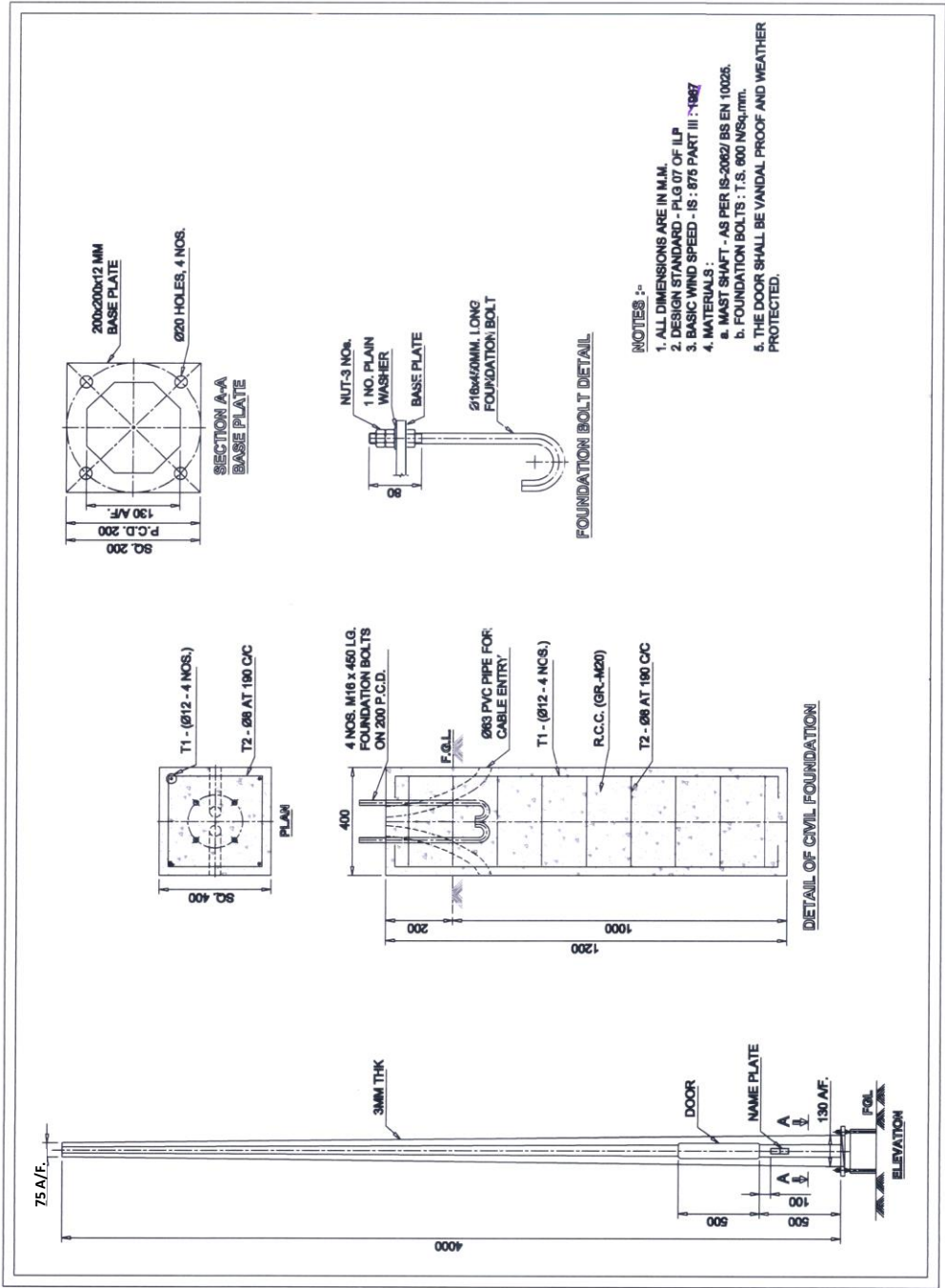
Note:-2 Before making a selection of pole it is necessary to assume a suitable factor of safety which has to be applied on breaking load or the crippling load of the pole as the case may be depending on the relevant electricity rules to obtain the working load of the pole. Values of working load of the poles with a factor of safety 2 on crippling load and factor 2.5 on breaking load are both given in above table for information. The user will have to calculate the working loads if different factor of safety other than those stated above are applied.

Note:-3 Load applied from top of the pole at a distance of 0.30 metre for poles 410 SP-1 to 410 SP-33 and at a distance of 0.60 metre for poles 410 SP-34 to 410 SP-80

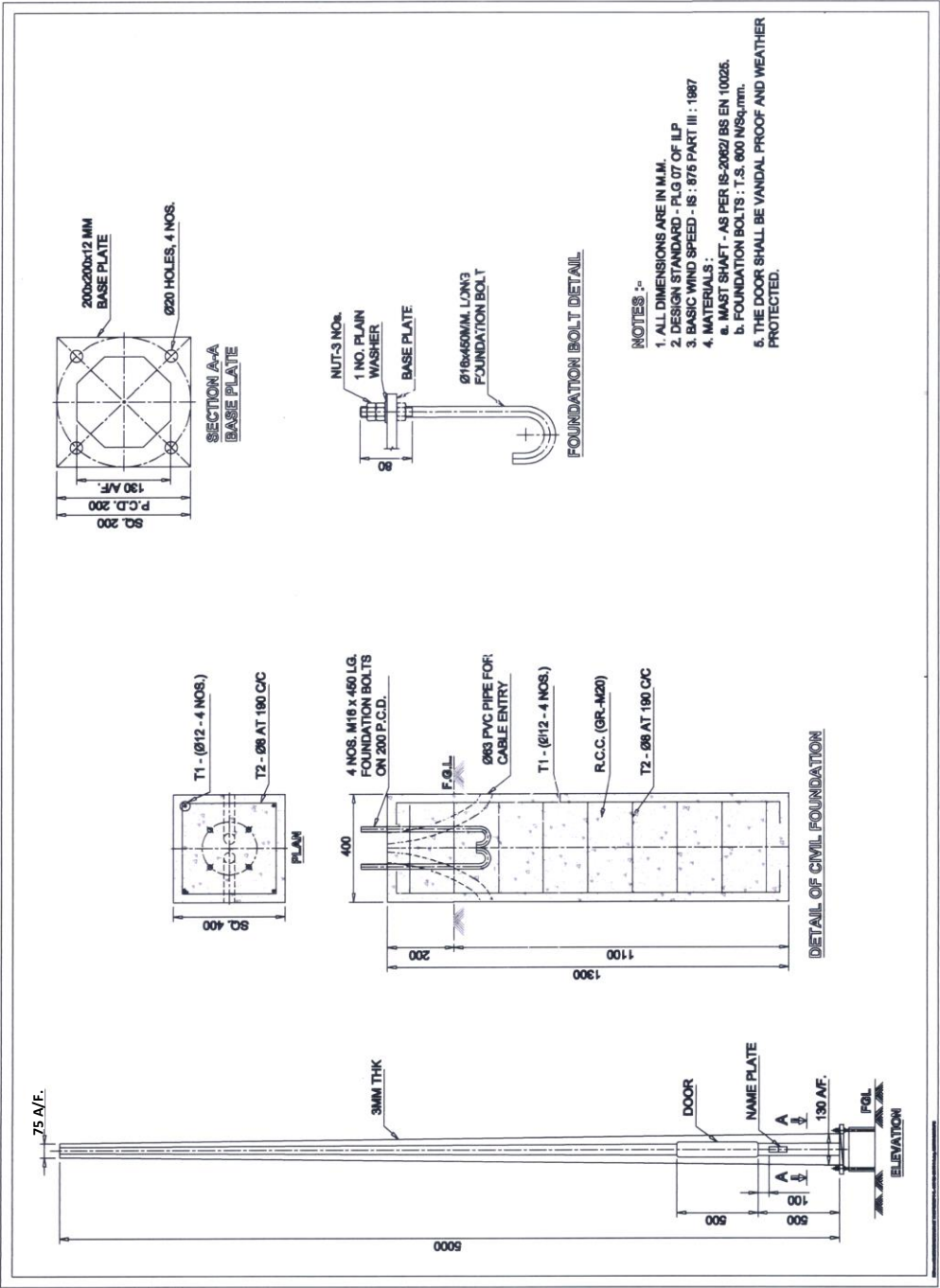
Drawing/Specification of 3M Octagonal Pole



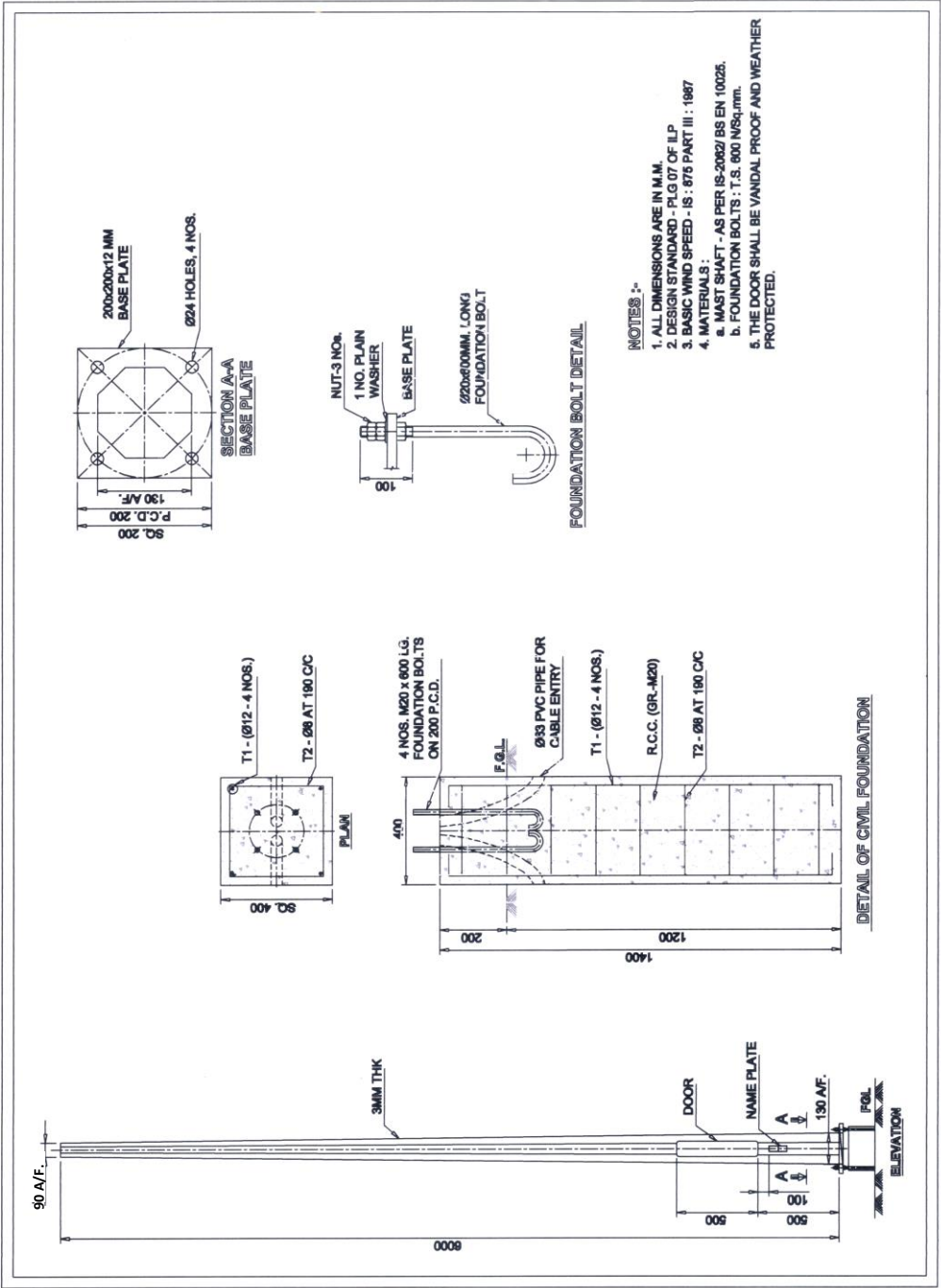
Drawing/Specification of 4M Octagonal Pole



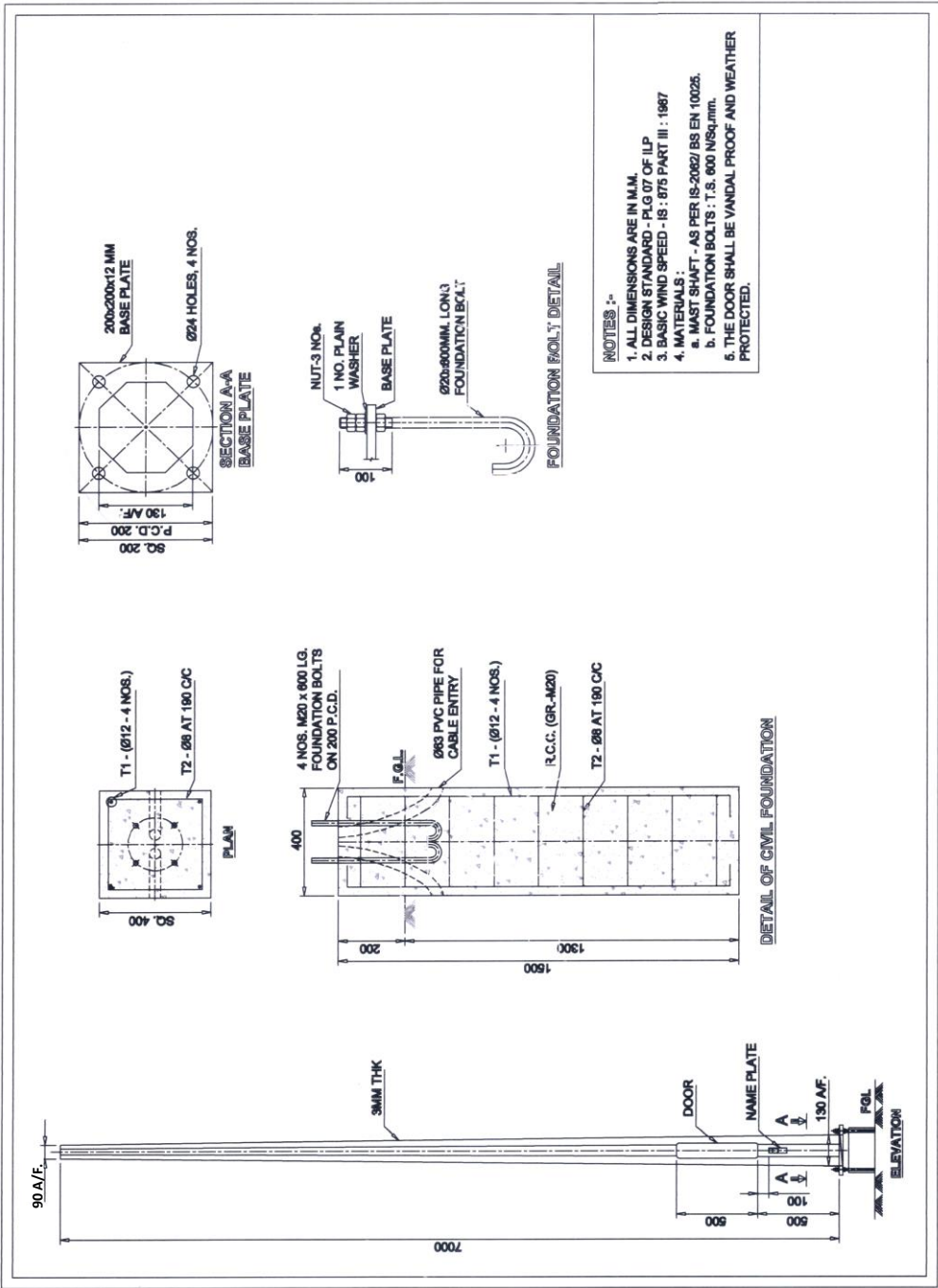
Drawing/Specification of 5M Octagonal Pole



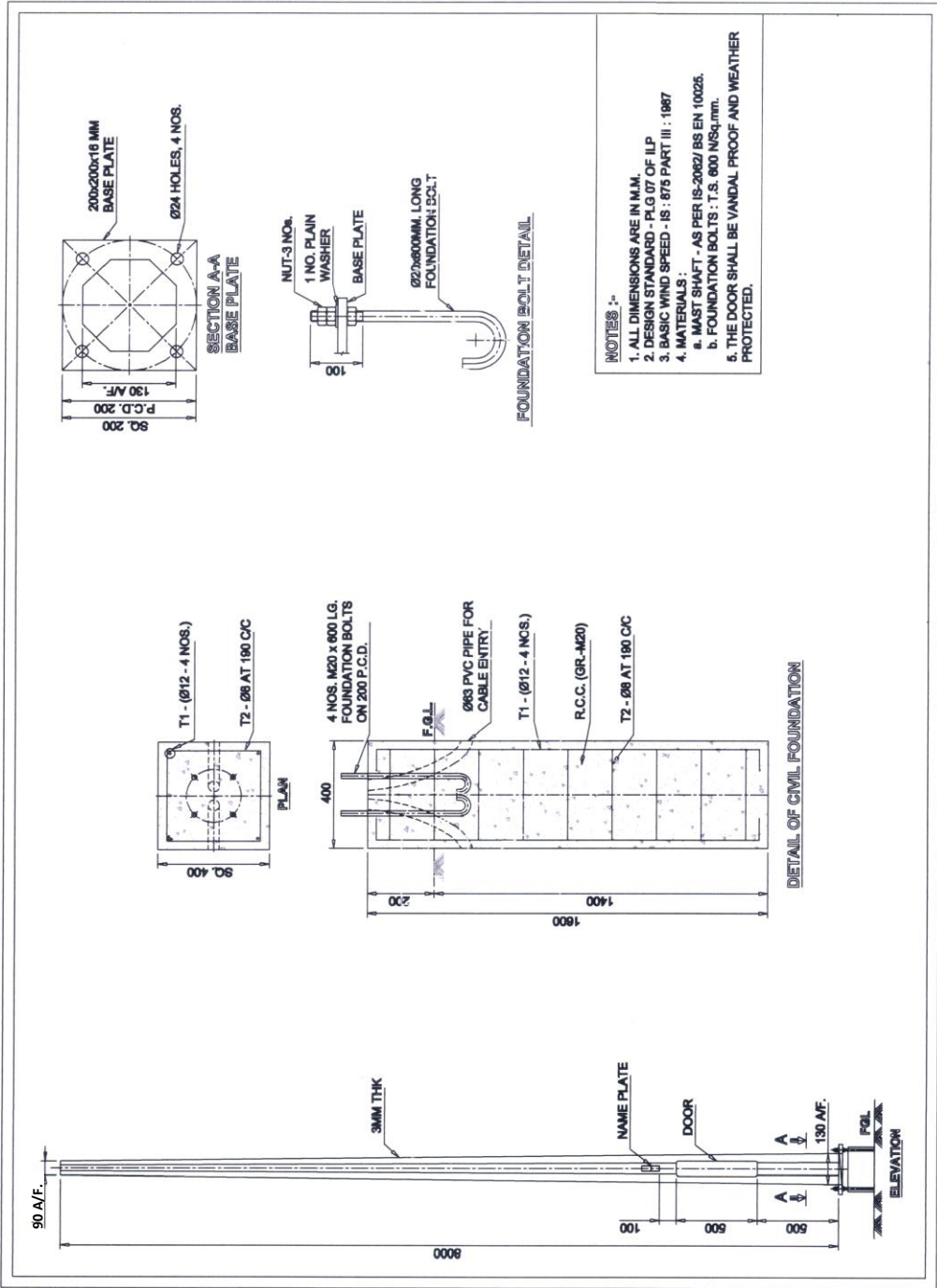
Drawing/Specification of 6M Octagonal Pole



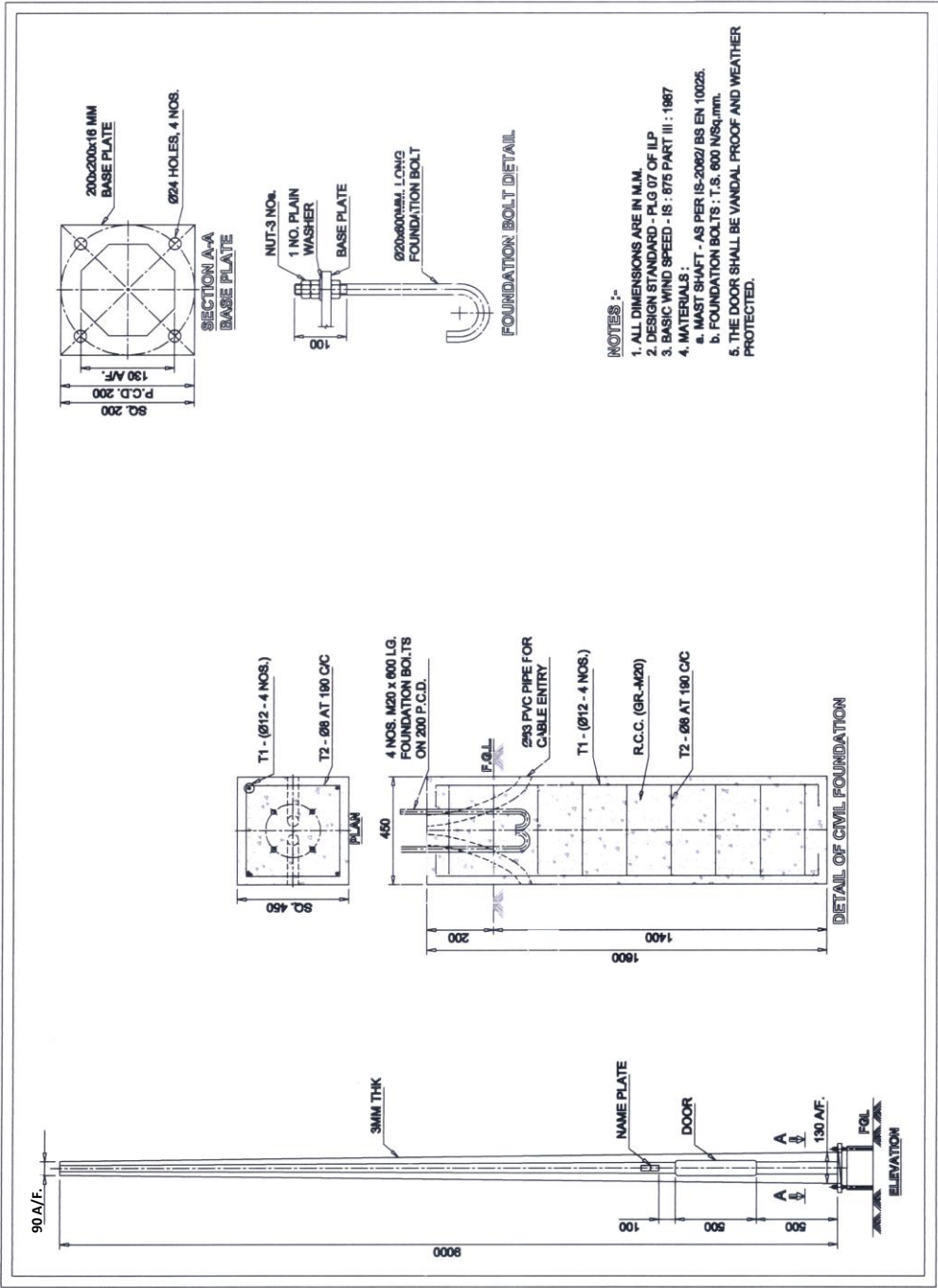
Drawing/Specification of 7M Octagonal Pole



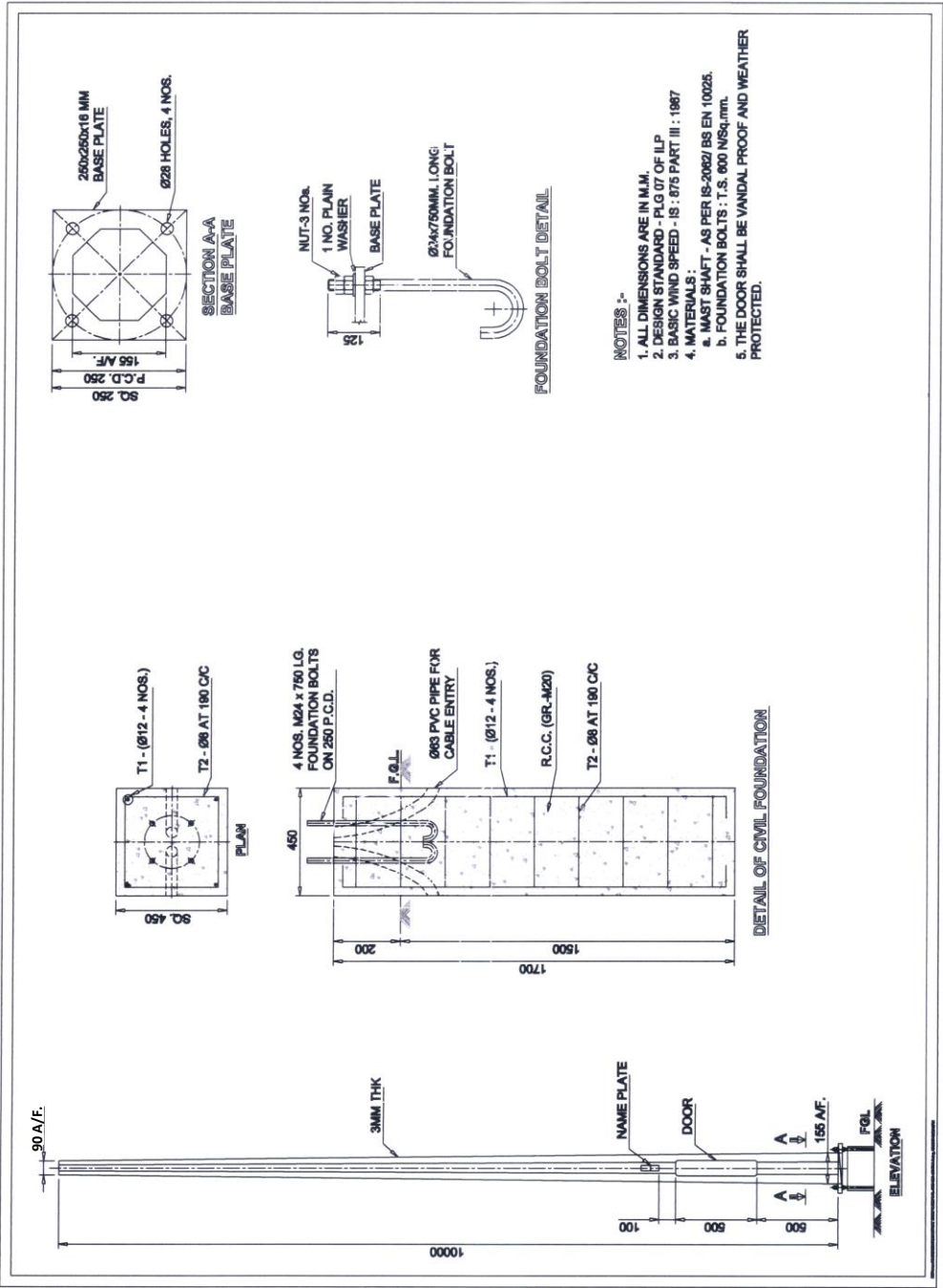
Drawing/Specification of 8M Octagonal Pole



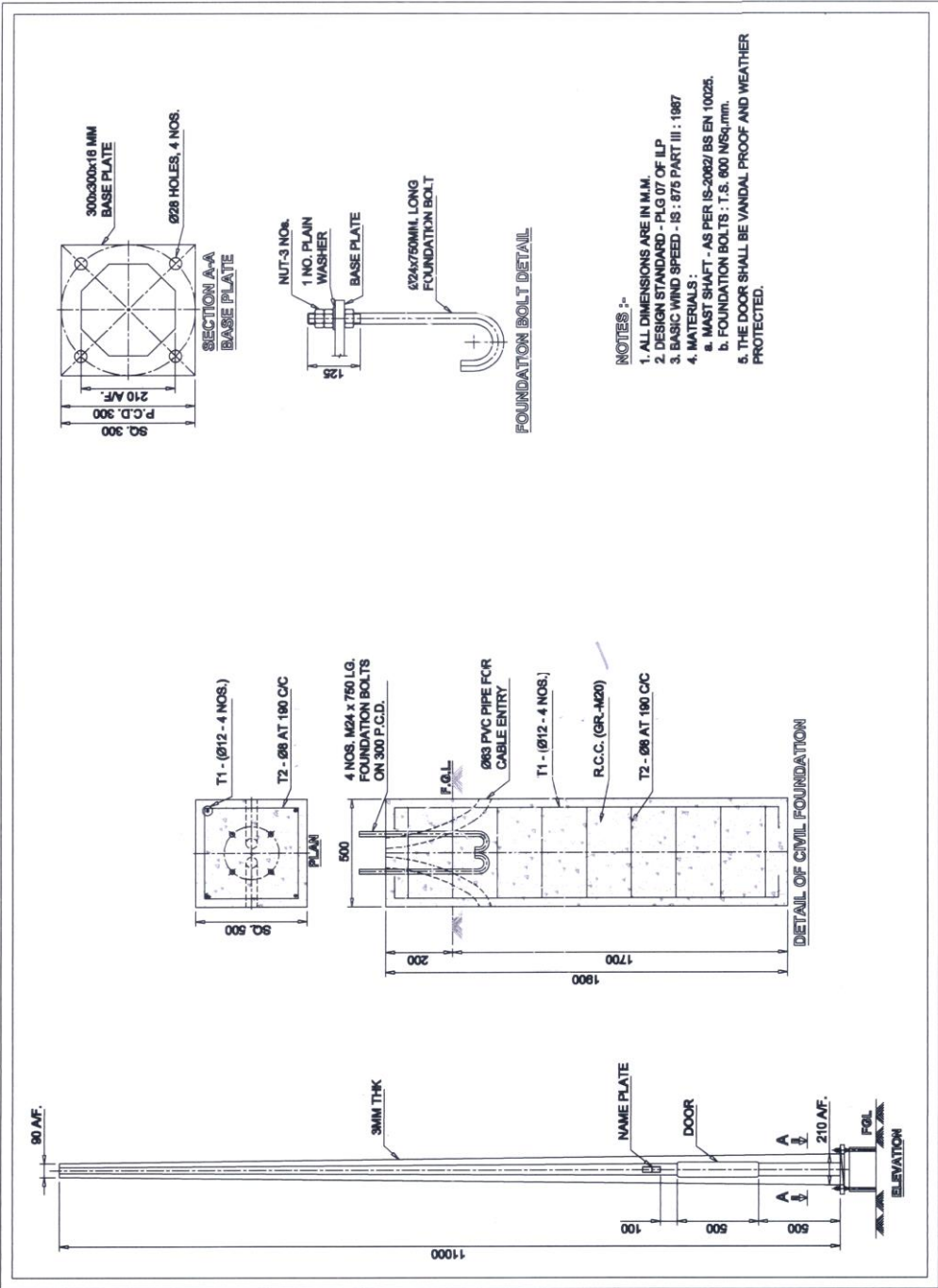
Drawing/Specification of 9M Octagonal Pole



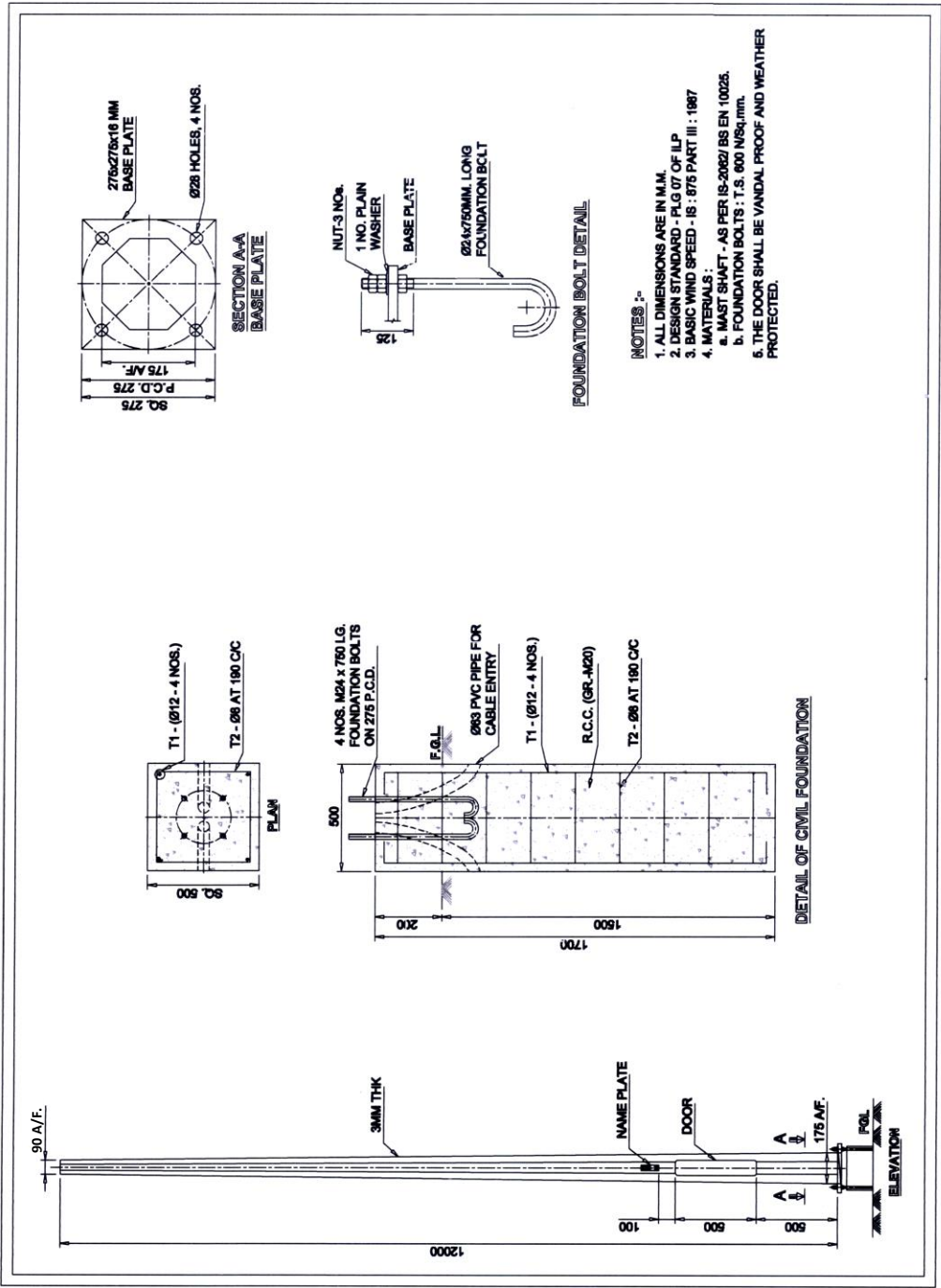
Drawing/Specification of 10M Octagonal Pole



Drawing/Specification of 11M Octagonal Pole

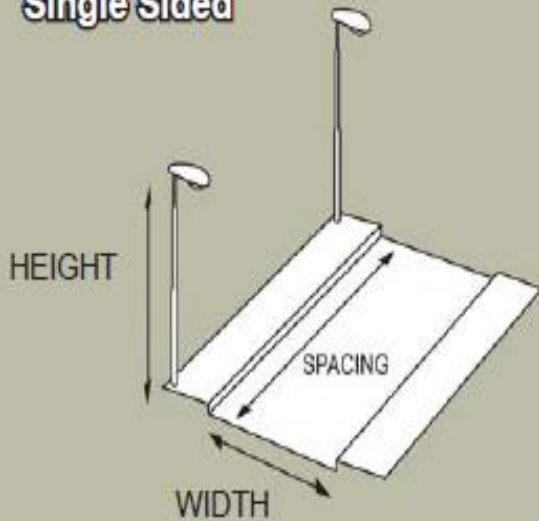


Drawing/Specification of 12M Octagonal Pole



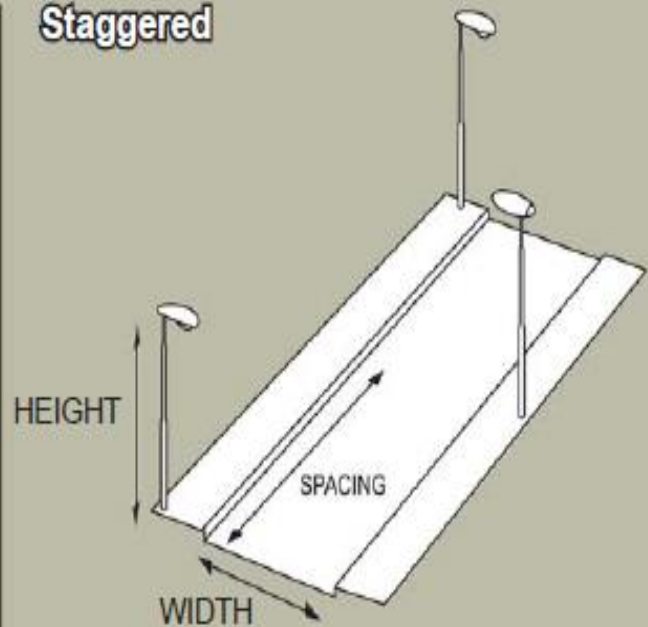
Pole Diagram

Single Sided



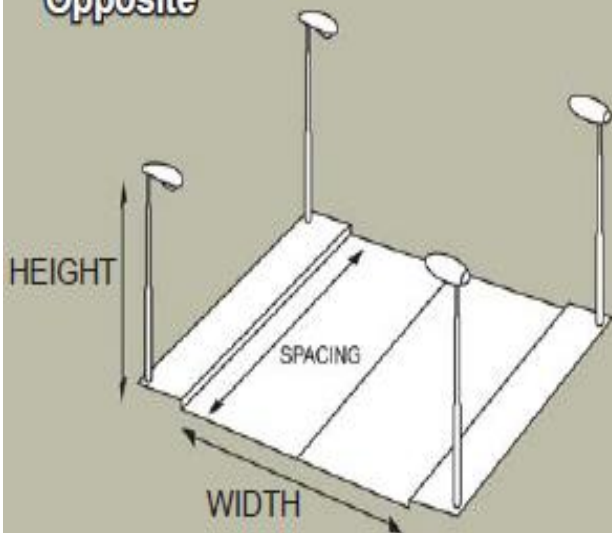
Height = Width
Spacing = 3.5 to 4 times Height

Staggered



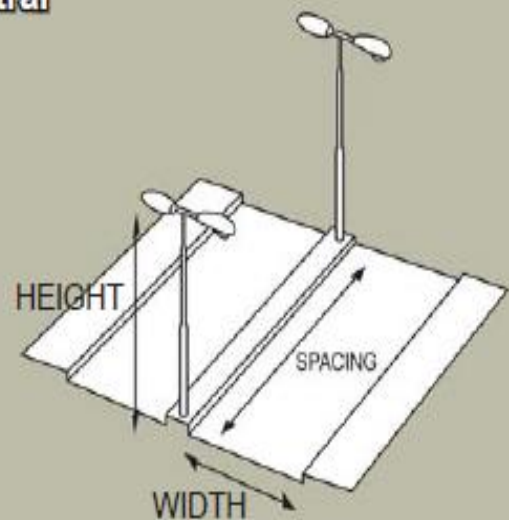
Height = 0.8 times Width
Spacing = 3.5 to 4 times Height

Opposite



Height = 0.5 times Width
Spacing = 3.5 to 4 times Height

Central



Height = 0.8 times Width
Spacing = 3.5 to 4 times Height

CHAPTER 19 - POLE AND POLE ERECTION

Code No.	Description	Unit	Rate Rs.
19.1	Supply of "H" beam steel pole as per IS specifications in standard length for over head line work:		
19.1.1	"H" beam steel pole 200x200x8x12 mm standard weight 52 kg /metre	Metre	2357.00
19.1.2	"H" beam steel pole 152x152x7x12 mm standard weight 37.1 kg /metre	Metre	1702.00
19.1.3	"H" beam steel pole 148x100x6x9 mm standard weight 26 kg /metre	Metre	1193.00
19.1.4	"H" beam steel pole 100x100x6x8 mm standard weight 21 kg /metre	Metre	963.00
19.2	Supply of steel R.S. JOIST as per IS specifications in standard length for over head line work:	Metre	
19.2.1	Designation ISMB200 size 100x200x10.8x5.7mm weight 25.4 kg /metre	Metre	1103.00
19.2.2	Designation ISMB175 size 175x90x8.6x5.5mm weight 19.3 kg /metre	Metre	841.00
19.2.3	Designation ISMB150 size 150x80x7.6x4.8mm weight 14.9 kg /metre	Metre	649.00
19.2.4	Designation ISMB125 size 125x75x7.6x4.4mm weight 13 kg /metre	Metre	566.00
19.2.5	Designation ISMB150 size 150x100x7.0x5.4mm weight 17 kg /metre	Metre	740.00
19.3	Supply of swaged steel tubular pole as per IS 2713 with base plate of size 300x300x6mm welded at bottom, necessary hole for cable entry and earthing stud welded at specified height including painting with one coat of red oxide zinc chromate primer.		
19.3.1	Designation 410 SP-2 height 7.00 metre	Each	4868.00
19.3.2	Designation 410 SP-5 height 7.50 metre	Each	5253.00
19.3.3	Designation 410 SP-8 height 7.50 metre	Each	6794.00
19.3.4	Designation 410 SP-11 height 8.00 metre	Each	5516.00
19.3.5	Designation 410 SP-14 height 8.00 metre	Each	7302.00
19.3.6	Designation 410 SP-17 height 8.50 metre	Each	5901.00
19.3.7	Designation 410 SP-20 height 8.50 metre	Each	7564.00
19.3.8	Designation 410 SP-23 height 8.50 metre	Each	9666.00
19.3.9	Designation 410 SP-26 height 9.00 metre	Each	6093.00
19.3.10	Designation 410 SP-30 height 9.00 metre	Each	8686.00
19.3.11	Designation 410 SP-32 height 9.00 metre	Each	10051.00
19.3.12	Designation 410 SP-35 height 9.50 metre	Each	8466.00
19.3.13	Designation 410 SP-38 height 9.50 metre	Each	10446.00
19.3.14	Designation 410 SP-41 height 10.00 metre	Each	8851.00
19.3.15	Designation 410 SP-44 height 10.00 metre	Each	10962.00
19.3.16	Designation 410 SP-47 height 10.00 metre	Each	14300.00
19.3.17	Designation 410 SP-50 height 11.00 metre	Each	9622.00
19.3.18	Designation 410 SP-53 height 11.00 metre	Each	11925.00
19.3.19	Designation 410 SP-56 height 11.00 metre	Each	15578.00
19.3.20	Designation 410 SP-59 height 12.00 metre	Each	12835.00
19.3.21	Designation 410 SP-62 height 12.00 metre	Each	16742.00
19.3.22	Designation 410 SP-65 height 12.00 metre	Each	20097.00
19.3.23	Designation 410 SP-68 height 13.00 metre	Each	18074.00

Code No.	Description	Unit	Rate Rs.
19.3.24	Designation 410 SP-71 height 13.00 metre	Each	21386.00
19.3.25	Designation 410 SP-73 height 14.50 metre	Each	20112.00
19.3.26	Designation 410 SP-76 height 14.50 metre	Each	24371.00
19.3.27	Designation 410 SP-77 height 16.00 metre	Each	21975.00
19.3.28	Designation 410 SP-80 height 16.00 metre	Each	26635.00
19.4	Supply of GI PIPE POLE made of "B" class GI pipe making necessary hole for cable entry and providing earthing stud (welded at specified height) including painting with one coat of red oxide zinc chromate primer.		
19.4.1	50 mm dia	Metre	338.00
19.4.2	65 mm dia	Metre	423.00
19.4.3	80 mm dia	Metre	537.00
19.5	Providing and welding M.S. base plate of size 300x300x3mm at bottom of GI/MS pipe pole.	Each	141.00
19.6	Supply of hot dipped galvanized (in single dip to minimum 75 micron) octagonal pole made of 3mm thick steel grade E-350 sheet having window and flush cover with locking arrangement at suitable height from base for cable termination block, pole suitably reinforced with welded steel section at window cut section to make the strength of pole unaffected, with following minimum specifications with 4 way terminal connector including 3mm thick anchor plate, 4 nos 16mm dia foundation bolts of EN8 grade, and as per IS 2062 & BS EN: 10025. (designed for wind speed upto 180km/hr, IS: 875 Part 3)		
19.6.1	3 metre high, dia 130mm at bottom and 75mm at top, base plate size 200x200x12mm, foundation bolts 450mm long	Each	4031.00
19.6.2	4 metre high, dia 130mm at bottom and 75mm at top, base plate size 200x200x12mm, foundation bolts 450mm long	Each	5051.00
19.6.3	5 metre high, dia 130mm at bottom and 75mm at top, base plate size 200x200x12mm, foundation bolts 600mm long	Each	5702.00
19.7	Supply of hot dipped galvanized (in single dip to minimum 75 micron) octagonal pole made of 3mm thick steel grade E-350 sheet having window and flush cover with locking arrangement at suitable height from base for cable termination block, pole suitably reinforced with welded steel section at window cut section to make the strength of pole unaffected, with following minimum specifications with 4 way terminal connector including 3mm thick anchor plate, 4 nos 20mm dia foundation bolts of EN8 grade, and as per IS 2062 & BS EN: 10025. (designed for wind speed upto 180km/hr, IS: 875 Part 3)		
19.7.1	6 metre high, dia 130mm at bottom and 90mm at top, base plate size 220x220x12mm, foundation bolts 600mm long	Each	6260.00
19.7.2	7 metre high, dia 130mm at bottom and 90mm at top, base plate size 220x220x12mm, foundation bolts 700mm long	Each	9297.00

Code No.	Description	Unit	Rate Rs.
19.7.3	8 metre high, dia 135mm at bottom and 90mm at top, base plate size 225x225x16mm, foundation bolts 750mm long	Each	10075.00
19.8	Supply of hot dipped galvanized (in single dip to minimum 75 micron) octagonal pole made of 3mm thick steel grade E-350 sheet having window and flush cover with locking arrangement at suitable height from base for cable termination block, pole suitably reinforced with welded steel section at window cut section to make the strength of pole unaffected, with following minimum specifications with 4 way terminal connector including 4mm thick anchor plate, 4 nos 24mm dia foundation bolts of EN8 grade, and as per IS 2062 & BS EN: 10025. (designed for wind speed upto 180km/hr, IS: 875 Part 3)		
19.8.1	9 metre high, dia 155mm at bottom and 90mm at top, base plate size 260x260x16mm, foundation bolts 750mm long	Each	11878.00
19.8.2	10 metre high, dia 175mm at bottom and 90mm at top, base plate size 275x275x16mm, foundation bolts 750mm long	Each	16101.00
19.8.3	11 metre high, dia 210mm at bottom and 90mm at top, base plate size 300x300x20mm, foundation bolts 750mm long	Each	17222.00
19.8.4	12 metre high, dia 240mm at bottom and 90mm at top, base plate size 320x320x20mm, foundation bolts 850mm long	Each	18557.00
19.9	Supply and fixing following street light pole bracket on existing pole made out of 50 mm dia MS "B" class pipe welded to 300 mm long MS pole canopy of suitable dia at a angle of 102.50 including having MS triangular stiffner of size 150 X 50 X 5 mm thick, making arrangement for tightening the bracket with pole by providing suitable size heavy duty nuts and bolts in canopy, painting with one coat of approved steel primer etc. as per specification.		
19.9.1	Single Over Hang 0.75 metre Long	Each	819.00
19.9.2	Single Over Hang 1.00 metre Long	Each	898.00
19.9.3	Single Over Hang 1.50 metre Long	Each	1048.00
19.9.4	Single Over Hang 2 metre Long	Each	1231.00
19.9.5	Double Over Hang 0.75 metre Long	Each	1152.00
19.9.6	Double Over Hang 1.00 metre Long	Each	1283.00
19.9.7	Double Over Hang 1.50 metre Long	Each	1589.00
19.9.8	Double Over Hang 2.00 metre Long	Each	1725.00
19.9.9	Triple Over Hang 1.00 metre Long	Each	1420.00
19.9.10	Triple Over Hang 1.50 metre Long	Each	1878.00
19.9.11	Triple Over Hang 2.00 metre Long	Each	2314.00
19.10	Erection of STEEL TUBULAR or "H" BEAM/ ISMB pole in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation and cement concrete collar of size 0.4 metre dia and 0.50 metre height from ground level including excavation and refilling etc. as per		

Code No.	Description	Unit	Rate Rs.
	specification of length:		
19.10.1	Upto 3.0 metre	Each	1272.00
19.10.2	3.5 metre to 5.0 metre	Each	1429.00
19.10.3	5.0 metre to 6.5 metre	Each	1576.00
19.10.4	7 metre to 10 metre	Each	2219.00
19.10.5	11 metre to 12 metre	Each	2460.00
19.10.6	13 metre to 14 metre	Each	2859.00
19.10.7	15 metre to 16 metre	Each	2979.00
19.11	Erection of GI octagonal/ tubular/conical pole on existing cement concrete foundation having grouted bolts and nuts, aligning in true vertical position as per specification.		
19.11.1	3 metre high	Each	433.00
19.11.2	4 metre high	Each	513.00
19.11.3	5 metre high	Each	593.00
19.11.4	6 metre high	Each	684.00
19.11.5	7 metre high	Each	723.00
19.11.6	8 metre high	Each	785.00
19.11.7	9 metre high	Each	837.00
19.11.8	10 metre high	Each	890.00
19.11.9	11 metre high	Each	956.00
19.11.10	12 metre high	Each	956.00
19.12	Designing and providing suitable RCC foundation in Cement Concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) for 3 mere to 12 metre high GI octagonal pole including steel reinforcement form work, embedding 2 nos 50mm dia PVC pipe for cable entry in each foundation, excavation disposal of surplus soil and curing etc. as per specification.	cum	4436.00
19.13	Providing and making suitable CC pole collar (muffing) in Cement Concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 20 mm nominal size) of size 0.4 m dia and 0.4 m height from existing CC foundation.	Each	213.00
19.14	Erection of steel tubular or "H beam POLE STRUT in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling and securing with holding clamps, bolts and nuts etc. as per specification:	Each	2529.00
19.15	Supplying and fixing of 32mm dia x 2 metre long G.I pipe (light) bracket for mounting street light fittings of all types on poles including bending the pipe to the required shape, 2 Nos 40x3mm flat iron clamps with bolts and nuts including wiring with 1.5 sq. mm W.P /PVC wire etc. as per specification.	Each	767.00
19.16	Supplying and fixing water tight terminal box made of 1.6mm thick M.S. sheet with detachable gland plate in bottom, hinged front open able cover, rubber gasket, having 1 Nos 4way connector and 1 No SPMCB inside the		

Code No.	Description	Unit	Rate Rs.
	box for cable connection, fixed to pole with 2 Nos clamp made from 40x3mm M.S. flat with 2 No nut bolt dully painted with 2 coat of red oxide paint and 2 coat aluminium paint complete as per specification.		
19.16.1	20x15x15 cms.	Each	594.00
19.16.2	30x20x15 cms.	Each	693.00
19.17	Supplying and fixing PVC water tight terminal box of approved make and brand with detachable gland plate in bottom, hinged front openable cover, rubber gasket, having 1 Nos 4way connector and 1 No SPMCB inside the box for cable connection, fixed to pole with 2 Nos clamp made from 25x3mm GI flat with 2 No GI nuts bolts complete as per specification.		
19.17.1	250x200x125 mm for single phase	Each	722.00
19.17.2	300x200x125 mm for 3 phase	Each	841.00
19.18	Supplying erection testing and commissioning of hot dipped galvanised (single dip, minimum 86 micron) 12 metre High mast pole on existing RCC foundation with all accessories and equipments, main detailed as below to withstand max wind pressure as per IS 875 Part-3: a) HM shaft made of approx weight 340 kg, sheet thickness 3 & 4 mm, nominal dia 360mm on bottom and 150 mm on top, base plate 25mm thick 520mm dia, approved no of sections (not more than 2) having suitable sectional lengths with slip joints between sections without any circumpherencial welding. b) Double drum winch with Integral single phase power tool (electrical) for lowering & raising of lantern carriage on high mast with separate handle for manual operation of winch with a torque limiting device for safe locking of carriage. c) Raising/lowering type lantern carriage designed to carry specified nos of luminaries, control gear box, junction box. d) Top pulley assemble with weather proof cover. e) Necessary suitable length and size stainless steel wire ropes (minimum 6mm dia and 7/19 construction) for lowering & rising of lantern carriage. f) Suitable size and length multicore flexible copper power trailing cable (minimum 6 Sqmm) g) Hinged service door in base section h) Base plate earthing terminal. i) Suitable arrangement for supply distribution with termination of suitable size underground cable in high mast. j) Lightning conductor finial made of 25mm dia 300 mm long G.I.tube having single prong. k) Anchor plate, tem-plates, GI foundation bolts min 6 Nos of 24mm dia 750 mm long (EN 8 Grade) along with nuts washers etc. (RCC fooundation and luminaries will be paid separately)	Each	163104.00

Code No.	Description	Unit	Rate Rs.
19.19	Supplying erection testing and commissioning of hot dipped galvanised (single dip 86 micron) 16 metre High mast pole on existing RCC foundation with all accessories and equipments, detailed as below to withstand wind pressure upto 180km/hr and minimum following specifications: a) HM shaft made of not more than 2 sections of suitable lengths with telescopic stressfit joints between sections without any circumferencial welding, sheet thickness 4mm top and bottom sections, nominal dia 460mm on bottom and 150 mm on top, base flange 25mm thick 670mm dia, PCD of foundation bolts 650mm. b) Double drum winch for lowering & raising of lantern carriage on high mast with operatable with power tool/ manual handle attachment with a torque limiting device for safe locking of carriage. c) Raising/lowering type lantern carriage designed to carry specified nos of luminaries, control gear box, junction box. d) Top pulley assemble with weather proof cover. e) 3 Nos suitable length and size stainless steel wire ropes (minimum 6mm dia and 7/19 construction) for lowering & raising of lantern carriage. f) Suitable size and length multicore flexible copper power trailing cable (minimum 3 core 4 Sqmm) g) Hinged service door in base section h) Base plate earthing terminal. i) Suitable arrangement for supply distribution with termination of suitable size underground cable in high mast. j) Lightning conductor finial made of 25mm dia 300 mm long G.I. tube having single prong. k) Anchor plate of size 840x840x6mm, tem-plates 3mm thick, GI foundation bolts 8 Nos of 30 mm dia 850 mm long (EN 8 Grade) along with nuts washers etc. (RCC fooundation and luminaries will be paid separately)	Each	198645.00
19.20	Supplying erection testing and commissioning of hot dipped galvanised (single dip 86 micron) 20 metre High mast pole on existing RCC foundation with all accessories and equipments, detailed as below to withstand wind pressure upto 180km/hr and minimum following specifications: a) HM shaft made of not more than 2 sections of suitable lengths with telescopic stressfit joints between sections without any circumferencial welding, sheet thickness 4mm top and bottom sections, nominal dia 460mm on bottom and 150 mm on top, base plate 30mm thick 670mm dia, PCD of foundation bolts 650mm. b) Double drum winch for lowering & raising of lantern carriage on high mast with operatable with power tool/ manual handle attachment with a torque limiting device for safe locking of carriage.	Each	226534.00

Code No.	Description	Unit	Rate Rs.
	c) Raising/lowering type lantern carriage designed to carry specified nos of luminaries, control gear box, junction box.d) Top pulley assemble with weather proof cover. e) 3 Nos suitable length and size stainless steel wire ropes (minimum 6mm dia and 7/19 construction) for lowering & raising of lantern carriage.f) Suitable size and length multicore flexible copper power trailing cable (minimum 3 core 4 Sqmm) g) Hinged service door in base sectionh) Base plate earthing terminal. i) Suitable arrangement for supply distribution with termination of suitable size underground cable in high mast.j) Lightning conductor finial made of 25mm dia 300 mm long G.I. tube having single prong. k) Anchor plate of size 750x750x6mm, tem-plates 3mm thick, GI foundation bolts 12 Nos of 30 mm dia 850 mm long (EN 8 Grade) along with nuts washers etc. (RCC foundation and luminaries will be paid separately)		
19.21	Supplying erection testing and commissioning of hot dipped galvanised (single dip, minimum 86 micron) 25 metre High mast pole on existing RCC foundation with all accessories and equipments, main detailed as below to withstand max wind pressure as per IS 875 Part-3: a) HM shaft made of approved no of sections (not more than 3) having suitable sectional lengths with slip joints between sections without any circumferencial welding sheet thickness 3 mm top & 4 mm middle and bottom section, nominal dia 460mm on bottom and 150 mm on top, base plate 25mm thick 670mm dia, PCD of foundation bolts 590mm. b) Double drum winch with Integral single phase power tool (electrical) for lowering & raising of lantern carriage on high mast with separate handle for manual operation of winch with a torque limiting device for safe locking of carriage. c) Raising/lowering type lantern carriage designed to carry specified nos of luminaries, control gear box, junction box. d) Top pulley assemble with weather proof cover. e) 2 Nos suitable length and size stainless steel wire ropes (minimum 6mm dia and 7/19 construction) for lowering & rising of lantern carriage. f) Suitable size and length multicore flexible copper power trailing cable (minimum 3 core 4 Sqmm) g) Hinged service door in base section h) Base plate earthing terminal. i) Suitable arrangement for supply distribution with termination of suitable size underground cable in high mast. j) Lightning conductor finial made of 25mm dia 300 mm long G.I.tube having single prong. k) Anchor plate, tem-plates, GI foundation bolts min 12 Nos of 30 mm dia	Each	315074.00

Code No.	Description	Unit	Rate Rs.
19.22	850 mm long (EN 8 Grade) along with nuts washers etc. (RCC foundation and luminaries will be paid separately) Supplying erection testing and commissioning of hot dipped galvanised (single dip 86 micron) 30 metre High mast pole on existing RCC foundation with all accessories and equipments, main detailed as below to withstand wind pressure upto 180km/hr and minimum following specifications: a) HM shaft made of not more than 3 sections of suitable lengths with telescopic stressfit joints between sections without any circumferential welding, sheet thickness 4mm top, middle and bottom sections, nominal dia 600mm on bottom and 150 mm on top, base plate 32mm thick 840mm dia, PCD of foundation bolts 740mm. b) Double drum winch for lowering & raising of lantern carriage on high mast with operatable with power tool/ manual handle attachment with a torque limiting device for safe locking of carriage. c) Raising/lowering type lantern carriage designed to carry specified nos of luminaries, control gear box, junction box. d) Top pulley assemble with weather proof cover. e) 3 Nos suitable length and size stainless steel wire ropes (minimum 6mm dia and 7/19 construction) for lowering & raising of lantern carriage. f) Suitable size and length multicore flexible copper power trailing cable (minimum 3 core 4 Sqmm) g) Hinged service door in base section h) Base plate earthing terminal. i) Suitable arrangement for supply distribution with termination of suitable size underground cable in high mast. j) Lightning conductor finial made of 25mm dia 300 mm long G.I.tube having single prong. k) Anchor plate of size 840x840x6mm, tem-plates 3mm thick, GI foundation bolts 16 Nos of 30 mm dia 850 mm long (EN 8 Grade) along with nuts washers etc. (RCC foundation and luminaries will be paid separately)	Each	396862.00
19.23	Designing and providing suitable and approved size RCC foundation for 12-30 mere high mast including steel reinforcement form work, embedding 2 nos 50mm dia PVC pipe for cable entry in each foundation, excavation disposal of surplus soil and curing etc. as per specification including laying and fixing HM foundation bolts with tam plates but excluding the cost of foundation bolts with tam plates etc complete as per specification.	cum	4436.00
19.24	Painting of following height steel tubular poles with two coat of approved colour and shade synthetic enamel paint including cleaning the surface as per specification:		
19.24.1	upto 6 metre	Each	94.00

Code No.	Description	Unit	Rate Rs.
19.24.2	Above 6 metre and upto 8 metre	Each	152.00
19.24.3	Above 8 metre and upto 10 metre	Each	225.00
19.24.4	Above 10 metre and upto 12 metre	Each	326.00
19.24.5	Above 12 metre and upto 14 metre	Each	370.00
19.25	Supplying and fixing of single over hang (Arm) 1000 MM (long)x50 mm dia decorative GI street light pole bracket made out of GI "A" Class pipe welded to 300 MM Long GI Pole canopy of suitable dia at angle of 102.50 Degree including having GI triangular stiffner and making arrangement for tightening the bracket with pole by providing suitable size heavy duty nuts and bolts in canopy including FRP Dome on existing pole etc. as per enclosed drawing and as per direction of engineer-in-charge.	Each	1685.00
19.26	Supplying and fixing of double over hang (Arm) 1000 MM (long)x50 mm dia decorative GI street light pole bracket made out of GI "A" Class pipe welded to 300 MM Long GI Pole canopy of suitable dia at angle of 102.50 Degree including having GI triangular stiffner and making arrangement for tightening the bracket with pole by providing suitable size heavy duty nuts and bolts in canopy including FRP Dome on existing pole etc. as per enclosed drawing and as per direction of engineer-in-charge.	Each	2339.00
19.27	Supplying and fixing of single over hang (Arm) 1500 MM (long)x50 mm dia decorative GI street light pole bracket made out of GI "A" Class pipe welded to 300 MM Long GI Pole canopy of suitable dia at angle of 102.50 Degree including having GI triangular stiffner and making arrangement for tightening the bracket with pole by providing suitable size heavy duty nuts and bolts in canopy including FRP Dome on existing pole etc. as per enclosed drawing and as per direction of engineer-in-charge.	Each	1743.00
19.28	Supplying and fixing of double over hang (Arm) 1500 MM (long)x50 mm dia decorative GI street light pole bracket made out of GI "A" Class pipe welded to 300 MM Long GI Pole canopy of suitable dia at angle of 102.50 Degree including having GI triangular stiffner and making arrangement for tightening the bracket with pole by providing suitable size heavy duty nuts and bolts in canopy including FRP Dome on existing pole etc. as per enclosed drawing and as per direction of engineer-in-charge.	Each	2425.00
19.29	Supply of hot dip galvanized CONICAL POLE as per BSEN ISO 1461 standard with minimum coating thickness of 75 micron. The galvanizing shall be done in single dipping. The pole shaft shall be made from 3 mm sheet steel confirming to BSEN10025 having yield strength of 355N/ Sq mm and silicon content less than 0.04%. The welding of pole shaft shall be done by Submerged Arc Welding (SAW) process. All Conical pole shafts shall be provided with the rigid flange plate manufacture from MSFE410 confirming to IS: 2062 of suitable thickness with provision for fixing 4 Nos 'J' type foundation bolts. The welding shall be done as per qualified MMAW		

Code No.	Description	Unit	Rate Rs.
	process approved by Third Party Inspectionagency. The Conical Poles shall be designed to with stand the maximum wind speed as per IS875 part III.The top loading i.e. area and the weight of fixtures are to be considered to calculate maximum deflection of the pole and the same shall meet the requirement of BSEN 40-2- 1 &3.The Conical Poles shall have door of approximate 500 mm length at the elevation of 500 mm from the Base plate. The door shall be vandal resistance and shall be weather proof to ensure safety of inside connections		
19.29.1	Supply of 3 M Height Conical Pole diameter 75 mm at top 107 at bottom. Baseplate Size 200 x 200 x 12 mm foundation bolt 450 mm long Mx16 EN 8 grade	Each	5222.00
19.29.2	Supply of 4 M Height Conical Pole diameter 75 mm at top 118 at bottom. Baseplate Size 200 x 200 x 12 mm foundation bolt 450 mm long Mx16 EN 8 grade	Each	6421.00
19.29.3	Supply of 5 M Height Conical Pole diameter 75 mm at top 129 at bottom. Baseplate Size 200 x 200 x 12 mm foundation bolt 450 mm long Mx16 EN 8 grade	Each	7310.00
19.29.4	Supply of 6 M Height Conical Pole diameter 75 mm at top 140 at bottom. Baseplate Size 200 x 200 x 16 mm foundation bolt 600 mm long Mx20 EN 8 grade	Each	7744.00
19.29.5	Supply of 7 M Height Conical Pole diameter 75 mm at top 151 at bottom. Baseplate Size 250 x 250 x 16 mm foundation bolt 750 mm long Mx20 EN 8 grade	Each	10521.00
19.29.6	Supply of 8 M Height Conical Pole diameter 75 mm at top 161 at bottom. Baseplate Size 250 x 250 x 16 mm foundation bolt 750 mm long Mx20 EN 8 grade	Each	12528.00
19.29.7	Supply of 9 M Height Conical Pole diameter 75 mm at top 173 at bottom. Baseplate Size 275 x 275 x 16 mm foundation bolt 750 mm long Mx24 EN 8 grade	Each	14643.00
19.29.8	Supply of 10 M Height Conical Pole diameter 75 mm at top 184 at bottom. Baseplate Size 275 x 275 x 16 mm foundation bolt 750 mm long Mx24 EN 8 grade	Each	18898.00
19.29.9	Supply of 11 M Height Conical Pole diameter 75 mm at top 195 at bottom. Baseplate Size 300 x 300 x 16 mm foundation bolt 750 mm long Mx24 EN 8 grade	Each	20648.00
19.29.10	Supply of 12 M Height Conical Pole diameter 75 mm at top 206 at bottom. Baseplate Size 300 x 300 x 16 mm foundation bolt 750 mm long Mx24 EN 8 grade	Each	23207.00

CHAPTER 20 – OVER HEAD LINES

All overhead line works shall be carried out as per item of work and as per BIS specifications:

(A) MEASUREMENT:

The items with units in each, set and pair shall be measured by counting in numbers.

The items with units in metre/ km shall be measured on linear basis with least count in 1 cm.

The item like G.I. wire, stay wires, angle iron etc having units in kg shall be measured in length and then weight will be calculated by multiplying the length with standard weight of item or actual weight of sample of specific length.

The Bituminous cable compound shall be measured by weight in kg with least count of 10 grams.

(B) RATE: Cost of all material, fixing, hanging, supporting, installation materials, carriage, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
20.1	Supply and fixing following overhead line accessories.		
20.1.1	Stay rod (19/20mm dia 1.8 metre long) with anchor plate 300x300x6.4mm in CC	Set	435.00
20.1.2	Stay wire 7/4.0mm dia	kg	33.00
20.1.3	Stay wire 7/3.15mm dia	kg	20.00
20.1.4	Turn buckle (19/20mmx60mm)	Each	210.00
20.1.5	MV Strain insulator	Each	28.00
20.1.6	Bow tightener	Each	139.00
20.1.7	MV Shackle insulator 75x90mm with G.I. bolts and nuts	Each	38.00
20.1.8	MV Shackle insulator 100x110mm with G.I. bolts and nuts	Each	63.00
20.1.9	MV Pin insulator 100x80mm with G.I. spindle and nuts etc.	Each	35.00
20.1.10	MV Pin insulator 100x80mm with G.I. spindle and nuts etc.	Each	37.00
20.1.11	Bituminous cable compound	kg	47.00
20.1.12	DC cross arm made of MS channel 100x50x5 mm @ 9.56 kg/m	Metre	451.00
20.2	Supplying and erection of stay set complete (galvanized) with 19/20mm dia x 1.8 metre long stay rod, anchor plate of size 300mm x 300mm x 6.4 mm, thimble stay clamps, turn buckle (19/20mm x 600mm), strain insulator and specified G.I. stay wire etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as per specification.		
20.2.1	With 7/4.00 mm dia G.I. stay wire	Each	2767.00
20.2.2	With 7/3.15 mm dia G.I. stay wire	Each	2785.00
20.3	Supplying and erection of stay set complete (galvanized) with 19/20mm dia x 1.8 metre long stay rod, anchor plate of size 300mm x 300mm x 6.4 mm, thimble stay clamps, bow tightener, strain insulator and specified G.I. stay wire etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded		

Code No.	Description	Unit	Rate Rs.
	stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as per specification.		
20.3.1	With 7/4.00 mm dia G.I. stay wire	Each	2751.00
20.3.2	With 7/3.15 mm dia G.I. stay wire	Each	2649.00
20.4	Supplying and erection of bow stay set complete (galvanized) 19/20mm dia x 1.8 metre long stay rod, anchor plate of size 30cmx30cmx6.4mm, thimble stay clamps, turn buckle 19/20mm x60 cm, strain insulator and specified G.I stay wire etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling and also with 0.6 m long brace of size 50mmx50mmx6mm angle iron with 50 mm dia pulley fixed at one of the brace as per specification.		
20.4.1	With 7/4.00 mm dia G.I. stay wire	Each	2848.00
20.4.2	With 7/3.15 mm dia G.I. stay wire	Each	2974.00
20.5	Supplying and erection of bow stay set complete (galvanized) 19/20mm dia x 1.8 metre long stay rod, anchor plate of size 30cmx30cmx6.4mm, thimble stay clamps, bow tightener, strain insulator and specified G.I stay wire etc. in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling and also with 0.6 m long brace of size 50mmx50mmx6mm angle iron with 50 mm dia pulley fixed at one of the brace as per specification.		
20.5.1	With 7/4.00 mm dia G.I. stay wire	Each	3077.85
20.5.2	With 7/3.15 mm dia G.I. stay wire	Each	2971.60
20.6	Supplying and erection of angle/channel iron cross arms/ bracket/ other fitting of approved size and shape including drilling of holes for insulator pins, bolts and nuts etc as per specification.	kg	65.00
20.7	Supplying and erection of channel iron 75x40x4.8 mm (7.14kg/m) cross arm for overhead line complete with clamps, bolts and nuts including drilling of holes for insulator pins, bolts and nuts etc as per specification.		
20.7.1	For 2 wire overhead line (0.55m long)	Set	329.00
20.7.2	For 4 wire overhead line (1.15m long)	Set	526.00
20.8	Supplying and fixing of channel iron 100x50x5 mm (9.56kg/m) cross arm (1.15m long) for 4 wire overhead line complete with clamps, bolts and nuts including drilling of holes for insulator pins, bolts and nuts etc as per specification.	Set	622.00
20.9	Supplying and erection of angle iron 50x50x6.0 (4.5kg/m) cross arm for overhead line complete with clamps, bolts and nuts including drilling of holes for insulator pins, bolts and nuts etc as per specification.		
20.9.1	For 2 wire overhead line (0.55m long)	Set	260.00
20.9.2	For 4 wire overhead line (1.15m long)	Set	391.00
20.10	Supplying and erection of galvanized 'D' iron complete with shackle		

Code No.	Description	Unit	Rate Rs.
	insulator, G.I. bolts and nuts, coach screw etc. as per specification.		
20.10.1	Shackle insulator size 75mm x 90mm	Set	227.00
20.10.2	Shackle insulator size 100mm x 110mm	Set	249.00
20.11	Supplying and erection of shackle insulator with G.I. bolts, nuts and straps etc. as per specification.		
20.11.1	Size 75mm x 90mm	Each	126.00
20.11.2	Size 100mm x 110mm	Each	154.00
20.12	Supplying and erection of pin insulator with G.I. spindle and nuts etc. as per specification.		
20.12.1	Size 100mm x 80mm.	Each	60.00
20.12.2	Size 100mm x 110mm.	Each	60.00
20.13	Erection of shackle / pin insulator etc. as per specification.	Each	20.00
20.14	Supplying and erection of guard for existing overhead lines as per specification including split insulator as per specification.		
20.14.1	Cradle type	Each	35.00
20.14.2	Hexagonal type	Each	35.00
20.14.3	Ring type	Each	35.00
20.15	Supplying and fixing guard insulator or split insulator complete		
20.15.1	25x25 mm	Pair	58.00
20.15.2	37x37 mm	Pair	62.00
20.15.3	50x50 mm	Pair	65.00
20.16	Supplying and erection aerial fuse complete as per specification.		
20.16.1	15 amp	Each	77.00
20.16.2	30 amp	Each	94.00
20.17	Supplying and erection of MV horn gap lightening arrester.	Each	295.00
20.18	Supplying and fixing approved make 11 KV glazed porcelain pin insulator with G.I. spindle on existing pole bracket with necessary materials as per specification:	Each	192.00
20.19	Supplying and fixing approved make 11 KV glazed porcelain disc type insulator with tension hardware on existing pole/ support/ cross arm channel as per specification complete:	Each	1003.00
20.20	Supplying and erection of 11 KV gang operated air break switch on existing two pole structure with insulators and all other accessories complete including locking arrangement as per specification.	Set	5774.00
20.21	Supplying and erection of 11 KV D.O. fuse unit on existing two pole structure with insulators and all other accessories complete including locking arrangement as per specification.	Set	3444.00
20.22	Supplying and erection of three piece nonlinear resistor type lightning arrester suitable for 3 wire, 11 KV overhead lines with rated voltage 9 KV (rms) with a nominal discharge current rating of 5 KA and complete with galvanised clamping arrangement, G.I. bolts, nuts, washers etc. as per	Set	4912.00

Code No.	Description	Unit	Rate Rs.
	specification.		
20.23	Supplying and erection of galvanised stay set for 11 KV over head lines complete with 19/ 20 mm dia X 1.8 metres long stay rod, anchor plate of size 45 cm X 45 cm X 7.5 mm thick, thimble, stay clamps, turn buckle (20 mm X 600 mm), 7/ 4.00 mm dia G.I. stay wire and 11 KV strain insulator etc in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as per specification.	Set	2965.00
20.24	Supplying and fixing approved make 33 KV glazed porcelain pin insulator with G.I. spindle on existing pole bracket with necessary materials as per specification:	Each	244.00
20.25	Supplying and fixing approved make 33 KV (3x11KV) glazed porcelain disc type insulator with tension hardware on existing pole/ support/ cross arm channel as per specification complete:	Set	2833.00
20.26	Supplying and erection of 33 KV gang operated air break switch on existing two pole structure with insulators and all other accessories complete including locking arrangement as per specification.	Set	16993.00
20.27	Supplying and erection of 33 KV D.O. fuse unit on existing two pole structure with insulators and all other accessories complete including locking arrangement as per specification.	Set	12227.00
20.28	Supplying and erection of single piece nonlinear resistor type lightning arrestor suitable for 3 wire, 33 KV overhead lines with rated voltage 30 KV (rms) with a nominal discharge current rating of 10 KA (station class) and complete with galvanised clamping arrangement, G.I. bolts, nuts, washers etc. as per specification.	Set	32331.00
20.29	Supplying and erection of galvanised stay set for 33 KV over head lines complete with 19/ 20 mm dia X 1.8 metres long stay rod, anchor plate of size 45 cm X 45 cm X 7.5 mm thick, thimble, stay clamps, turn buckle (20 mm X 600 mm), 7/ 4.00 mm dia G.I. stay wire and 33 KV strain insulator etc in cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm nominal size) foundation including excavation and refilling etc. as per specification.	Set	3603.00
20.30	Supplying and erection of G.I wire of size 8 SWG to 4 SWG including binding etc. as per specification.	kg	89.00
20.31	Supplying and erection standards all aluminium. conductor of approved make (confirming to IS 398-1961) of approved make at existing insulator at height upto 14m from ground level including stringing, binding with insulator, jointing wherever required, jumpering, tearing off connection etc complete etc. as per specification including clearing off obstacle if any:		
20.31.1	7/1.96mm dia	Km	15139.00
20.31.2	7/2.44mm dia	Km	22860.00

Code No.	Description	Unit	Rate Rs.
20.31.3	7/2.79mm dia	Km	30169.00
20.31.4	7/3.40mm dia	Km	42881.00
20.31.5	7/3.91mm dia	Km	55406.00
20.31.6	7/4.17mm dia	Km	61411.00
20.32	Supply and erection standard ACSR (aluminium conductor steel reinforced) confirming to IS 398-1961 of approved make at existing insulator at height upto 14m from ground level including stringing, binding with insulator, jointing wherever required, jumpering, tearing off connection etc complete etc. as per specification including clearing off obstacle if any:		
20.32.1	Squirrel 6/1/2.11mm dia with calculated aluminium area 20.98 sq.mm, weight 85 kg/ km (50 amps)	Km	15531.00
20.32.2	Weasel 6/1/2.59mm dia with calculated aluminium area 31.61 sq.mm , weight 128 kg/ km (80 amps)	Km	24044.00
20.32.3	Rabbit 6/1/3.35mm dia with calculated aluminium area 52.88 sq.mm, weight 214 kg/ km (100 amps)	Km	38552.00
20.32.4	Raccoon 6/1/4.09mm dia with calculated aluminium area 78.83 sq.mm , weight 319 kg/ km (198 amps)	Km	56647.00
20.32.5	Dog 6/4.72(AL), 7/1.57(S) mm dia with calculated aluminium area 105 sq.mm , weight 394 kg/ km (248 amps)	Km	70247.00
20.32.6	Wolf 30/2.59(AL), 7/2.59 mm dia with calculated aluminium area 158 sq.mm, weight 726 kg/ km(400 amps)	Km	34618.00
20.32.7	Panther 30/3(AL), 7/3(S) mm dia with calculated aluminium area 212.1 sq.mm weight 974 kg/ km (400 amps)	Km	172779.00
20.33	Supplying and erection DANGER BOARD made MS sheet duly painted and maked as per IE rules and specification.	Each	48.00
20.34	Supply and errection of following Polymer Insulator with G.I. Bolt, Nuts and Straps etc. as per specification.		
20.34.1	33 KV Composite Disc Insulator	Each	220.00
20.34.2	33 KV Polymer Disc Insulator {45kN}	Each	220.00
20.34.3	11 KV Disc Insulator	Each	130.00
20.34.4	33 KV Pin Insulator with Pin	Each	326.00
20.34.5	11 KV Pin Insulator with Pin	Each	150.00

CHAPTER 21 – TRANSFORMER & DG SETS

All works shall be carried out as per item of work, as per relevant BIS specifications and as per additional specifications attached with tender documents:

(A) MEASUREMENT:

The items with units each and set shall be measured by counting in numbers,.

(B) RATE: Cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
21.1	Supplying and installation of outdoor type Transformer ONAN type with copper winding having following continuous KVA rating, 11 /0.415 KV, 3 Phase 50 Hz Vector group DYn-11, (Online tap changer) tapings in steps of $\pm 2.5\%$, $\pm 5\%$, $--7.5\%$ with oil conservator, silica gel breather having connecting terminals on HV side suitable for bare conductor/HT cable connection, cable end box on medium voltage side suitable for 1.1 KV single / $3\frac{1}{2}$ core cable (upto 300 sq mm)/bus ducting arrangement and confirming to IS:1180 Part-2 Level 3, on existing double pole structure or Brick /CC/RCC platform with all fittings, accessories, filled with filtered transformer oil including testing and commissioning etc. complete as per specification		
21.1.1	100 KVA	Each	256866.00
21.1.2	160 KVA	Each	332726.00
21.1.3	200 KVA	Each	393663.00
21.1.4	250 KVA	Each	493152.00
21.1.5	315 KVA	Each	557238.00
21.1.6	400 KVA	Each	639938.00
21.1.7	500 KVA	Each	1036497.00
21.1.8	630 KVA	Each	1176898.00
21.1.9	800 KVA	Each	1284992.00
21.1.10	1000 KVA	Each	1490084.00
21.1.11	1250 KVA	Each	1689809.00
21.1.12	1600 KVA	Each	1934925.00
21.1.13	2000 KVA	Each	2141261.00
21.1.14	2500 KVA	Each	2385278.00

Code No.	Description	Unit	Rate Rs.
21.2	Supplying and installation of outdoor type Transformer ONAN type with copper winding having following continuous KVA rating, 33 /0.415 KV 3 Phase 50 Hz Vector group DYn-11, (Online tap changer) tapings in steps of $\pm 2.5\%$, $\pm 5\%$, -7.5% with oil conservator, silica gel breather having connecting terminals on HV side suitable for bare conductor/HT cable connection, cable end box on medium voltage side suitable for 1.1 KV single / $3\frac{1}{2}$ core cable (upto 300 sq mm)/bus ducting arrangement and confirming to IS:1180 Part-2 Level 3 on existing Brick /CC/RCC platform with all fittings, accessories, filled with filtered transformer oil including testing and commissioning etc. complete as per specification		
21.2.1	500 KVA	Each	1164278.00
21.2.2	630 KVA	Each	1268454.00
21.2.3	800 KVA	Each	1392664.00
21.2.4	1000 KVA	Each	1593325.00
21.2.5	1250 KVA	Each	1758804.00
21.2.6	1600 KVA	Each	2007449.00
21.2.7	2000 KVA	Each	2208184.00
21.2.8	2500 KVA	Each	2451500.00
21.3	Supplying, installation, testing and commissioning of following capacity diesel Generating Set (alternator directly coupled to diesel engine) compete in all respect broadly comprising of following and as per CPCB 2 norms (upto date ammended), including following specification. A. Alternator : Self excited, brush less type, of following capacity, 3 phase, 415 volts 50 Hz, 4 pole, AC alternator complete with all accessories.B. Engine : water cooled diesel engine of suitable BHP for rated alternator at 1500 rpm, turbo charged, direct injection type, 4 stroke, 4/6 cylinder including specified size fuel tank of approved design and shape duly calibrated and painted with one coat of primer and two coats of synthetic enameled paint of approved colour, residential type silencer with exhaust MS pipe (upto 2 metre beyond silencer) duly wrapped with asbestos rope of legging of specified quality and specification.C. AMF Panel : Cubical, compartmentalized, AMF panel board with all suitable size power and control contactors, switches, meters and other accessories, internal wiring, connection, inter-connection etc. for trouble free smooth functioning of DG Set complete with battery charger and leads as per specification.D. Base Plate : Common base plate of required size for mounting of engine alternator set fabricated from MS channel and vibration damping arrangement with cushy foot mounting i/c painting etc. as per specification.		

Code No.	Description	Unit	Rate Rs.
21.3.1	15 KVA	Set	328091.00
21.3.2	20 KVA	Set	359295.00
21.3.3	25 KVA	Set	408005.00
21.3.4	30 KVA	Set	433375.00
21.3.5	40 KVA	Set	536883.00
21.3.6	50 KVA	Set	670059.00
21.3.7	70 KVA	Set	820831.00
21.3.8	100 KVA	Set	977033.00
21.3.9	125 KVA	Set	1014640.00
21.3.10	160 KVA	Set	1331016.00
21.3.11	200 KVA	Set	1684102.00
21.3.12	250 KVA	Set	2066141.00
21.3.13	300 KVA	Set	2672030.00
21.3.14	400 KVA	Set	3163009.00
21.3.15	500 KVA	Set	3842023.00
21.3.16	800 KVA	Set	5857424.00
21.4	Supplying and spreading hard stone aggregate 25mm size in out door switch yards as per direction of Engineer-in-charge.	cum	770.00
21.5	Providing and erecting floor mounted sand/ water bucket stand for keeping 4 nos. of fire bucket, 1500 mm in length and 900 mm in height made out of 30 X 30 X 4 mm angle iron welded with 4 hooks and duly painted with one coat of zinc cromate primer and 2 coat of synthetic enamel paint of post box red colour etc complete.	Each	1249.00
21.6	Supplying G.I. Fire buckets with round bottom having at least 9 lit. capacity duly painted with one coat of zinc cromate primer and 2 coat of synthetic enamel paint of post box red colour and filled with dry sand and kept on provided wall hook or stand etc complete.	Each	289.00
21.7	Supply and laying SMC chequere plate in size 1m x 1m x 2.5mm (thick) to withstand 22 KV Electrical stress near LT or 11 KV HT panel etc complete.	Sqm	1226.00
21.8	Supplying and erecting chain link mesh fencing for electric sub-station switch yard of 2.5 m approx. height from ground level using angle iron size 50 X 50 X 6 mm erected in C.C. foundation 15 X 15 X 40 cm deep at every 2 metre fitted with flat iron support of size 25 X 6 mm on top, bottom and mid way and chain link mesh 50 x 50 mm aparture and 4 mm dia G.I. hard wire securing and screwing with 2mm dia G.I. wire, G.I. staples, G.I.U-nails or steel pins to the angle iron at every distance of 30 cms, by iron studs complete duly painted with one coats of red oxide and two coats of approved colour paint.(Area of fencing i.e. height x length is to be measured)	Sqm	434.00

Code No.	Description	Unit	Rate Rs.
21.9	Supplying and erecting MS gate of approx. size 3.0 m (W) x 2.0 m (H) in two laps for electric sub-station switch yard fencing frame made of angle iron size 50 X 50 X 6 mm on top bottom and sides fitted with flat iron support of size 25 X 6 mm on mid way horizontally and square bar of size 8 mm at every 100mm vertically including 3 sets of heavy duty MS hinges and aldop complete duly painted with one coats of red oxide and two coats of approved colour paint.	Sqm	882.00
21.10	Supply & filling of transformer oil ESV Grade 335 in existing 11/33KV transformer including all accessories, transportation etc. Complete as required, As per IS: 355	Per Ltr	122.00
21.11	Filtration of transformer oil with oil filtration machine, including sampling of oil before & after filtration and Ir value with all accessories, transportation etc, complete as required.	Per Ltr	13.00

CHAPTER 22 – LIFTS

All works shall be carried out as per item of work and as per relevant BIS specifications and additional specifications attached with tender documents. The work is to be done on turn key basis including cost of all necessary material, machinery and labour required to complete the job whether it is mentioned in tender document or not . Drawing for general guidance are attached at the end of chapter

(A) MEASUREMENT: The items of works shall be measured in by counting in numbers,.

(B) RATE: Cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
22.1	Supply, installation, testing & commissioning and putting into operation and final testing of automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) and fulfilling following requirements on turn key basis. A. Type : Passenger lift B. Load : 8 passenger/ 544 Kg C. Speed : 1.0 metre per second D. Control : AC2 E. Operation : Microprocessor based simplex collective selective with/without lift attendant F. Total rise : About 9 mtrs G. Landings : 4 All on same side H. Floors served : G,1,2,3 I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings J. Lift shaft size : About 1900 mm width X 1900 mm depth, finished with plaster K. Lift car size : About 1300 mm width X 1100 mm depth L. Car entrance : Minimum Clear opening 800 mm wide X 2000 mm high protected with car door M. Landing entrance: Clear opening 800 mm wide X 2000 mm high protected with landing door N. Car door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type O. Landing door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type P. Door operation: Automatic electric power operated door with infra red protection Q. Car interior : Stainless steel panel with hair line/ mirror/moon rock finish on all sides	Job	1156156.00

Code No.	Description	Unit	Rate Rs.
	R. Car floor : Hard wood covered with PVC/ marbled tiles		
	S. Car ceiling & lighting : Fluorescent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium.		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car.		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & control room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing terminal		
22.2	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in automatic lift for 8 persons, speed 1.0 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	80288.00
22.3	Supply, installation, testing & commissioning and putting into operation and final testing of automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981 and fulfilling following requirements on turn key basis.	Job	1541542.00
	A. Type : Passenger lift		
	B. Load : 8 passenger/ 544 Kg		
	C. Speed : 1.5 metre per second		
	D. Control : AC2		
	E. Operation : Microprocessor based simplex collective selective with/without lift attendant		
	F. Total rise : About 9 mtrs		
	G. Landings : 4 All on same side		
	H. Floors served : G,1,2,3		
	I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
	J. Lift shaft size : About 1900 mm width X 1900 mm depth, finished with plaster (size as per actual site conditions)		
	K. Lift car size : About 1300 mm width X 1100 mm depth		
	L. Car entrance : Minimum Clear opening 800 mm wide X 2000 mm high protected with car door		
	M. Landing entrance: Clear opening 800 mm wide X 2000 mm high protected with landing door		

Code No.	Description	Unit	Rate Rs.
	N. Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	O. Landing door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	P. Door operation: Automatic electric power operated door with infra red protection		
	Q. Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
	R. Car floor : Hard wood covered with PVC/ marblex tiles		
	S. Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & contol room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing termanal		
22.4	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in automatic lift for 8 persons, speed 1.5 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	80288.00
22.5	Supply, installation, testing & commissitioning and putting into operation and final testing of automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981and fulfilling following requirments on turn key basis.	Job	1413080.00
	A. Type : Passenger lift		
	B. Load : 13 passenger/ 884 Kg		
	C. Speed : 1.0 metre per second		
	D. Contol : AC2		
	E. Operation : Microprosser based simplex collective selective with/without lift attendant		
	F. Total rise : About 9 mtrs		
	G. Landings : 4 All on same side		
	H. Floors served : G,1,2,3		
	I. Signals : Digital car position indicator, car travel direction indicator		

Code No.	Description	Unit	Rate Rs.
	in car & at all landings		
	J. Lift shaft size : About 2500 mm width X 1900 mm depth, finished with plaster (size as per actual site conditions)		
	K. Lift car size : About 2000 mm width X 1100 mm depth		
	L. Car entrance : Minimum Clear opening 900 mm wide X 2000 mm high protected with car door		
	M. Landing entrance: Clear opening 900 mm wide X 2000 mm high protected with landing door		
	N. Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	O. Landing door : Stainless steel/ Glass Door two pannel centre opening flush type		
	P. Door operation: Automatic electric power operated door with infra red protection		
	Q. Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
	R. Car floor : Hard wood covered with PVC/ marblax tiles		
	S. Car ceiling & lighting : Fluorescent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & control room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing terminal		
22.6	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in automatic lift for 13 persons, speed 1.0 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	86712.00
22.7	Supply, installation, testing & commissioning and putting into operation and final testing of automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981 and fulfilling following requirements on turn key basis.	Job	1798466.00
	A. Type : Passenger lift		
	B. Load : 13 passenger/ 884 Kg		

Code No.	Description	Unit	Rate Rs.
C.	Speed : 1.5 metre per second		
D.	Contol : AC2		
E.	Operation : Microprosser based simplex collective selective with/without lift attendant		
F.	Total rise : About 9 mtrs		
G.	Landings : 4 All on same side		
H.	Floors served : G,1,2,3		
I.	Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
J.	Lift shaft size : About 2500 mm width X 1900 mm depth, finished with plaster (size as per actual site conditions)		
K.	Lift car size : About 2000 mm width X 1100 mm depth		
L.	Car entrance : Minimum Clear opening 900 mm wide X 2000 mm high protected with car door		
M.	Landing entrance: Clear opening 900 mm wide X 2000 mm high protected with landing door		
N.	Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
O.	Landing door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
P.	Door operation: Automatic electric power operated door with infra red protection		
Q.	Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
R.	Car floor : Hard wood covered with PVC/ marblex tiles		
S.	Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
T.	Car ventilation : Pressure fan with anodised aluminium grill		
U.	Emergency lighting in car: Battery operated Emergency lighting in the lift car		
V.	Intercom system : Battery operated Intercom system in lift car, machine room and control room		
W.	Emergency alarm : Battery operated alarm bell system in lift car & contol room		
X.	Position of machine room: Directly above the lift shaft		
Y.	Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
Z.	Fire man switch : Fire man switch at main landing termanal		

Code No.	Description	Unit	Rate Rs.
22.8	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in automatic lift for 13 persons, speed 1.5 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	86712.00
22.9	Supply, installation, testing & commissitioning and putting into operation and final testing of automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981and fulfilling following requirments on turn key basis. A. Type : Passenger lift B. Load : 16 passenger/ 1088 Kg C. Speed : 1.0 metre per second D. Contol : AC2 E. Operation : Microprosser based simplex collective selective with/without lift attendant F. Total rise : About 9 mtrs G. Landings : 4 All on same side H. Floors served : G,1,2,3 I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings J. Lift shaft size : About 2500 mm width X 2100 mm depth, finished with plaster (size as per actual site conditions) K. Lift car size : About 2000 mm width X 1300 mm depth L. Car entrance : Minimum Clear opening 1000 mm wide X 2000 mm high protected with car door M. Landing entrance: Clear opening 1000 mm wide X 2000 mm high protected with landing door N. Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type O. Landing door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type P. Door operation: Automatic electric power operated door with infra red protection Q. Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides R. Car floor : Hard wood covered with PVC/ marplex tiles S. Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium T. Car ventilation : Pressure fan with anodised aluminium grill U. Emergency lighting in car: Battery operated Emergency lighting in the lift car	Job	1798466.00

Code No.	Description	Unit	Rate Rs.
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & control room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing terminal		
22.10	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in automatic lift for 16 persons, speed 1.0 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	96347.00
22.11	Supply, installation, testing & commissioning and putting into operation and final testing of automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981 and fulfilling following requirements on turn key basis.	Job	2183851.00
	A. Type : Passenger lift		
	B. Load : 16 passenger/ 1088 Kg		
	C. Speed : 1.5 metre per second		
	D. Control : AC2		
	E. Operation : Microprocessor based simplex collective selective with/without lift attendant		
	F. Total rise : About 9 mtrs		
	G. Landings : 4 All on same side		
	H. Floors served : G,1,2,3		
	I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
	J. Lift shaft size : About 2500 mm width X 2100 mm depth, finished with plaster (size as per actual site conditions)		
	K. Lift car size : About 2000 mm width X 1300 mm depth		
	L. Car entrance : Minimum Clear opening 1000 mm wide X 2000 mm high protected with car door		
	M. Landing entrance: Clear opening 1000 mm wide X 2000 mm high protected with landing door		
	N. Car door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type		
	O. Landing door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type		
	P. Door operation: Automatic electric power operated door with infra red protection		
	Q. Car interior : Stainless steel panel with hair line/ mirror/moon rock		

Code No.	Description	Unit	Rate Rs.
	finish on all sides		
	R. Car floor : Hard wood covered with PVC/ marblex tiles		
	S. Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & contol room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing terminal		
22.12	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in automatic lift for 16 persons , speed 1.5 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	96347.00
22.13	Supply, installation, testing & commissitioning and putting into operation and final testing of MACHINE ROOM LESS TYPE automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) and fulfilling following requirments on turn key basis.	Job	1348849.00
	A. Type : Passenger lift		
	B. Load : 4 passenger/ 272 Kg		
	C. Speed : 1.0 metre per second		
	D. Contol : AC2		
	E. Operation : Microprosser based simplex collective selective with/without lift attendant		
	F. Total rise : About 9 mtrs		
	G. Landings : 4 All on same side		
	H. Floors served : G,1,2,3		
	I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
	J. Lift shaft size : About 1400 mm width X 1200 mm depth, finished with plaster (size as per actual site conditions)		
	K. Lift car size : About 1000 mm width X 770 mm depth		
	L. Car entrance : Clear opening 760 mm wide X 2000 mm high protected with car door		
	M. Landing entrance: Clear opening 760 mm wide X 2000 mm high		

Code No.	Description	Unit	Rate Rs.
	protected with landing door		
	N. Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	O. Landing door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	P. Door operation: Automatic electric power operated door with infra red protection		
	Q. Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
	R. Car floor : Hard wood covered with PVC/ marblex tiles		
	S. Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & contol room		
	X. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Y. Fire man switch : Fire man switch at main landing termanal		
22.14	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in MACHINE ROOM LESS TYPE automatic lift for 4 persons, speed 1.0 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	67442.00
22.15	Supply, installation, testing & commissitioning and putting into operation and final testing of MACHINE ROOM LESS TYPE automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981and fulfilling following requirments on turn key basis.	Job	1477311.00
	A. Type : Passenger lift		
	B. Load : 6 passenger/ 408 Kg		
	C. Speed : 1.0 metre per second		
	D. Contol : AC2		
	E. Operation : Microprosser based simplex collective selective with/without lift attendant		
	F. Total rise : About 9 mtrs		
	G. Landings : 4 All on same side		
	H. Floors served : G,1,2,3		

Code No.	Description	Unit	Rate Rs.
	I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
	J. Lift shaft size : About 1800 mm width X 1680 mm depth, finished with plaster (size as per actual site conditions)		
	K. Lift car size : About 1100 mm width X 1000 mm depth		
	L. Car entrance : Clear opening 800 mm wide X 2000 mm high protected with car door		
	M. Landing entrance: Clear opening 800 mm wide X 2000 mm high protected with landing door		
	N. Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	O. Landing door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
	P. Door operation: Automatic electric power operated door with infra red protection		
	Q. Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
	R. Car floor : Hard wood covered with PVC/ marblex tiles		
	S. Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & contol room		
	X. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Y. Fire man switch : Fire man switch at main landing termanal		
22.16	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in MACHINE ROOM LESS TYPE automatic lift for 6 persons, speed 1.0 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	73866.00
22.17	Supply, installation, testing & commissitioning and putting into operation and final testing of MACHINE ROOM LESS TYPE automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981and fulfilling following requirments on turn key basis.	Job	1670004.00
	A. Type : Passenger lift		

Code No.	Description	Unit	Rate Rs.
B.	Load : 8 passenger/ 544 Kg		
C.	Speed : 1.5 metre per second		
D.	Contol : AC2		
E.	Operation : Microprosser based simplex collective selective with/without lift attendant		
F.	Total rise : About 9 mtrs		
G.	Landings : 4 All on same side		
H.	Floors served : G,1,2,3		
I.	Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
J.	Lift shaft size : About 1400 mm width X 1200 mm depth, finished with plaster (size as per actual site conditions)		
K.	Lift car size : About 1800 mm width X 1760 mm depth		
L.	Car entrance : Clear opening 800 mm wide X 2000 mm high protected with car door		
M.	Landing entrance: Clear opening 800 mm wide X 2000 mm high protected with landing door		
N.	Car door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
O.	Landing door : Stainless steel/ Glass Door two pannel telescopic/centre opening flush type		
P.	Door operation: Automatic electric power operated door with infra red protection		
Q.	Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
R.	Car floor : Hard wood covered with PVC/ marblex tiles		
S.	Car ceiling & lighting : Fluorscent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
T.	Car ventilation : Pressure fan with anodised aluminium grill		
U.	Emergency lighting in car: Battery operated Emergency lighting in the lift car		
V.	Intercom system : Battery operated Intercom system in lift car, machine room and control room		
W.	Emergency alarm : Battery operated alarm bell system in lift car & contol room		
X.	Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
Y.	Fire man switch : Fire man switch at main landing termanal		

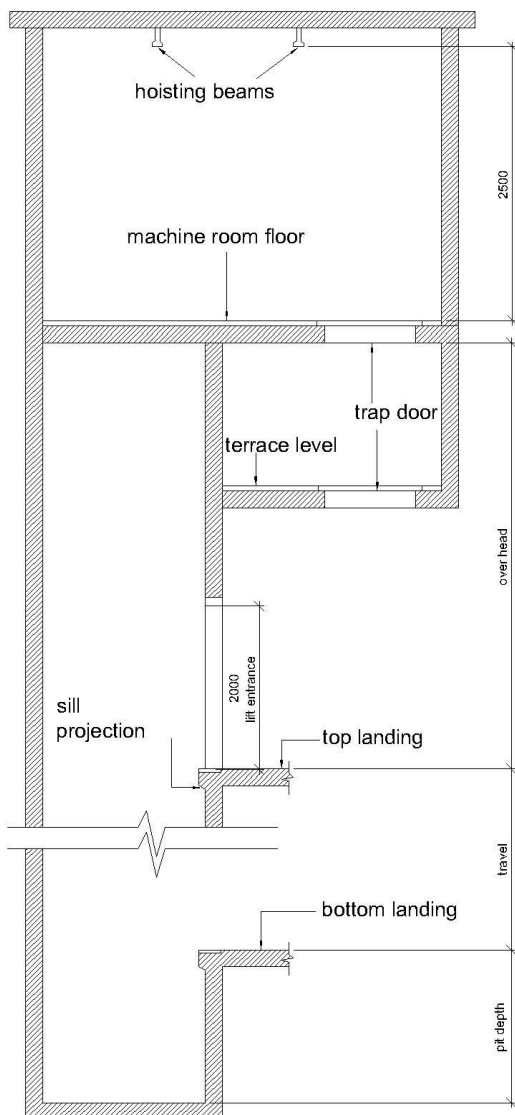
Code No.	Description	Unit	Rate Rs.
22.18	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in MACHINE ROOM LESS TYPE automatic lift for 8 persons, speed 1.5 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	80288.00
22.19	Supply, installation, testing & commissioning and putting into operation and final testing of MACHINE ROOM LESS TYPE automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981 and fulfilling following requirements on turn key basis. A. Type : Passenger lift B. Load : 13 passenger/ 884 Kg C. Speed : 1.5 metre per second D. Control : AC2 E. Operation : Microprocessor based simplex collective selective with/without lift attendant F. Total rise : About 9 mtrs G. Landings : 4 All on same side H. Floors served : G,1,2,3 I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings J. Lift shaft size : About 2500 mm width X 1900 mm depth, finished with plaster (size as per actual site conditions) K. Lift car size : About 2000 mm width X 1100 mm depth L. Car entrance : Minimum Clear opening 900 mm wide X 2000 mm high protected with car door M. Landing entrance: Clear opening 900 mm wide X 2000 mm high protected with landing door N. Car door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type O. Landing door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type P. Door operation: Automatic electric power operated door with infra red protection Q. Car interior : Stainless steel panel with hair line/ mirror/moon rock finish on all sides R. Car floor : Hard wood covered with PVC/ marbled tiles S. Car ceiling & lighting : Fluorescent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium T. Car ventilation : Pressure fan with anodised aluminium grill U. Emergency lighting in car: Battery operated Emergency lighting in the lift	Job	1926927.00

Code No.	Description	Unit	Rate Rs.
	car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & control room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing terminal		
22.20	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in MACHINE ROOM LESS TYPE automatic lift for 13 persons, speed 1.5 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	86712.00
22.21	Supply, installation, testing & commissioning and putting into operation and final testing of MACHINE ROOM LESS TYPE automatic lift complete with ARD and all standard equipments, accessories and control equipments as per manufacturer's design and as per CPWD specification (Part III LIFTS) 1981 and fulfilling following requirements on turn key basis.	Job	2312313.00
	A. Type : Passenger lift		
	B. Load : 16 passenger/ 1088 Kg		
	C. Speed : 1.5 metre per second		
	D. Control : AC2		
	E. Operation : Microprocessor based simplex collective selective with/without lift attendant		
	F. Total rise : About 9 mtrs		
	G. Landings : 4 All on same side		
	H. Floors served : G,1,2,3		
	I. Signals : Digital car position indicator, car travel direction indicator in car & at all landings		
	J. Lift shaft size : About 2500 mm width X 2100 mm depth, finished with plaster (size as per actual site conditions)		
	K. Lift car size : About 2000 mm width X 1300 mm depth		
	L. Car entrance : Minimum Clear opening 1000 mm wide X 2000 mm high protected with car door		
	M. Landing entrance: Clear opening 1000 mm wide X 2000 mm high protected with landing door		
	N. Car door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type		
	O. Landing door : Stainless steel/ Glass Door two panel telescopic/centre opening flush type		
	P. Door operation: Automatic electric power operated door with infra red		

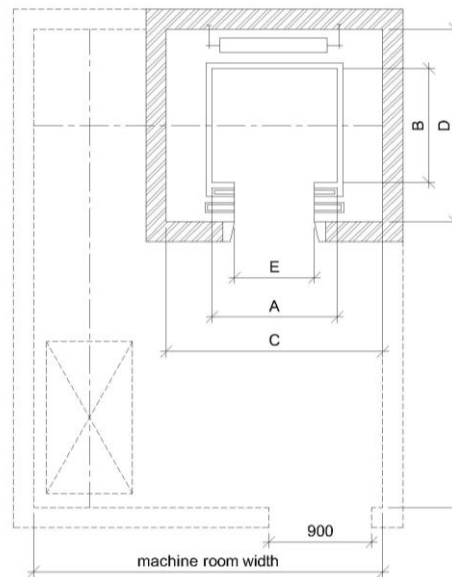
Code No.	Description	Unit	Rate Rs.
	protection		
	Q. Car interior : Stainless steel pannel with hair line/ mirror/moon rock finish on all sides		
	R. Car floor : Hard wood covered with PVC/ marbled tiles		
	S. Car ceiling & lighting : Fluorescent lighting concealed by suspended false ceiling with plain acrylic diffuser. The frame of suspended false ceiling shall be of powder coated aluminium		
	T. Car ventilation : Pressure fan with anodised aluminium grill		
	U. Emergency lighting in car: Battery operated Emergency lighting in the lift car		
	V. Intercom system : Battery operated Intercom system in lift car, machine room and control room		
	W. Emergency alarm : Battery operated alarm bell system in lift car & control room		
	X. Position of machine room: Directly above the lift shaft		
	Y. Electric power supply : AC 415 Volts 3 phase 50 Hz terminated in machine room		
	Z. Fire man switch : Fire man switch at main landing terminal		
22.22	Add or deduct for providing all additional parts/ equipments or for enhancing the capacity of parts/ equipments in MACHINE ROOM LESS TYPE automatic lift for 16 persons, speed 1.5 m/sec for every additional floor beyond initial G+3 floors.	each additional floor	96347.00

CHAPTER 22 – LIFTS

RECOMMENDED DIMENSIONS OF PASSENGER LIFTS



ELEVATION



PLAN

Dimension Table No 1

LOAD		CAR INSIDE		LIFT WELL		ENTRANCE
PERSONS	Kg.	A	B	C	D	E
4	272	1100	700	1900	1300	700
6	408	1100	1000	1900	1700	700
8	544	1300	1100	1900	1900	800
10	680	1300	1350	1900	2100	800
13	884	2000	1100	2500	1900	900
16	1088	2000	1300	2500	2100	1000
20	1360	2000	1500	2500	2400	1000

All dimensions are in mm

Dimension Table No 2

SPEED IN M/S	Upto 0.7	>0.7<=1.0	>1.0<=1.5	>1.5<=1.75	>1.75<=2.0	>2.0<=2.5
PIT DEPTH	1350	1500	1600	2150	2200	2500
OVERHEAD	4200	4250	4800	4800	5200	5400
MACHINE ROOM DEPTH	D+2000	D+2000	D+2000	D+2500	D+2500	D+2500
MACHINE ROOM WIDTH	C+1000	C+1000	C+1200	C+1200	C+1500	C+1500

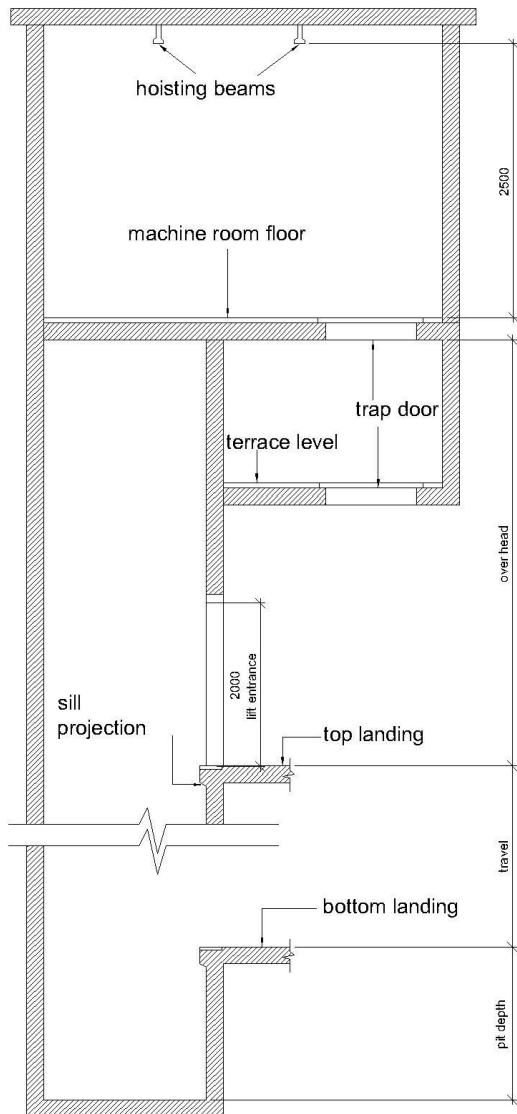
Note

- The total headroom has been calculated on the basis of car height of 2.3m.
- All dimensions given above for lifts having centre opening power operated doors with counterweight at rear, are recommended dimension primarily for architects and building planners. Any variations mutually agreed between manufacturer and purchasers are permitted. However, variation in:
 - Car inside dimension shall be within the maximum area limits specified in 5 of IS 14665 (Part 3/ Sec 1).
 - Entrance width on higher side is permitted.
 - Entrance width on lower side is permitted upto 100mm subject to minimum of 700mm.
- Dimensions of pit depth and overhead may differ in practice as per individual manufacture design depending upon load, speed and drive. However, the pit depth and overhead shall be such as to conform to the requirements of bottom clearance and top clearance of IS 14665 (Part 2/sec 1).

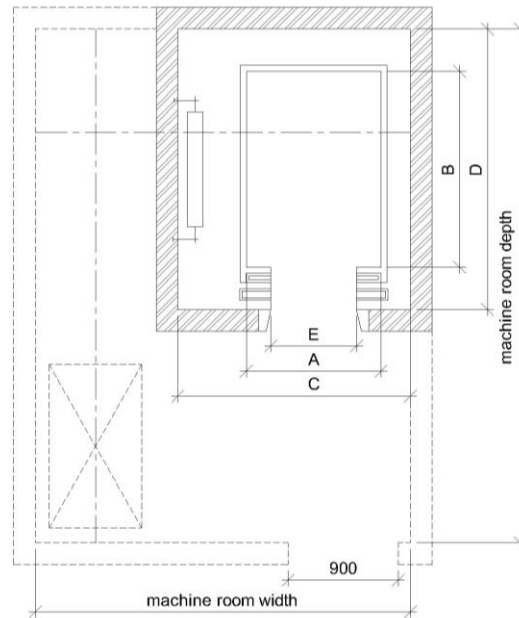
CHAPTER 22 – LIFTS

RECOMMENDED DIMENTIONS OF GOODS LIFTS

(For speed upto 1.5m/s)



ELEVATION



PLAN

LOAD	CAR INSIDE		LIFT WELL		ENTRANCE
	A	B	C	D	E
500	1100	1200	1900	1500	1100
1000	1400	1800	2300	2100	1400
1500	1700	2000	2600	2300	1700
2000	1700	2500	2600	2800	1700
2500	2000	2500	2900	2800	2000
3000	2000	3000	2900	3300	2000
4000	2000	3000	3400	3300	2500
5000	2500	3600	3400	3900	2500

All dimensions are in mm

Note

1. The total headroom has been calculated on the basis of car height of 2.2m
2. Clear entrance width 'E' is based on vertical lifting car door and vertical bi-parting landing doors. For collapsible midbar doors the clear entrance width will be reduced by 200mm (maximum 1800mm).
3. All dimensions given above are recommended dimensions primarily for architects and building planners. Any variations mutually agreed between manufacturers and purchasers are permitted. However, variation in car inside dimensions shall be within the maximum areas limits specified in IS 14665 (Part3/ Sec1).
4. Dimensions of pit depth and overhead may differ in practice as per individual manufacturer design depending upon load, speed and drive. However, the pit depth and overhead shall be such as to conform to the requirement of bottom clearance and top clearance of IS 14665 (Part2/Sec1).

CHAPTER 23 – WATER SUPPLY PUMPS

All works shall be carried out as per item of work, as per relevant BIS specifications and additional specifications attached with tender documents:

(A) MEASUREMENT:

The items having unit in set or each shall be measured in by counting in numbers, the pipe line shall be measured on linear basis with least count in 1 cm including length covered by accessories like “T”, elbow, bends etc and no separate payment for accessories like “T”, elbow, bend etc shall be made.

(B) RATE: Cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item. In the cost of pipe line cost of accessories like “T”, elbow, bend etc in included in item of pipe line.

Code No.	Description	Unit	Rate Rs.
23.1	Supplying, installation, testing and commissioning of centrifugal type mono-block self priming electric pump set suitable for single phase, 230 volts AC supply including connection of suction and delivery line etc. as per specification.		
23.1.1	0.25 HP single phase	Each	2348.00
23.1.2	0.50 HP single phase	Each	2857.00
23.1.3	1.0 HP single phase	Each	4193.00
23.1.4	2.0 HP single phase	Each	8304.00
23.2	Supplying, installation, testing and commissioning of centrifugal type mono-block electric pump set for water supply system having following capacity three phase, 415 volts AC induction motor and pump including suitable channel iron base frame, suitable C.C. foundation and connection of suction and delivery line etc. as per specification.		
23.2.1	3 HP, 420 LPM, 20 m head, suction size 65 mm, delivery size 50 mm	Each	10197.00
23.2.2	5 HP, 750 LPM, 20 m head, suction size 80 mm, delivery size 65 mm	Each	13643.00
23.2.3	7.5 HP, 650 LPM, 30 m head, suction size 80 mm, delivery size 65 mm	Each	17905.00
23.3	Supplying, installation, testing and commissioning of submersible pump set for water supply system with submersible motor directly coupled to multi-stage submersible pump of specified discharge capacity, head, delivery size in existing bore well including 2 sets of suitable size holding clamps made out of 50 mm X 6 mm MS flat, connection with suitable submersible cable of standard length etc. as per specification and IS : 694 (2010). Submersible cable should be rust proof, safe from oil / grease and under water chemical / Abrasion resistant.		
23.3.1	1.0 HP, single phase	Each	13501.00
23.3.2	1.5 HP, single phase	Each	14951.00
23.3.3	2.0 HP, single phase	Each	16834.00

Code No.	Description	Unit	Rate Rs.
23.3.4	3.0 HP, three phase	Each	19307.00
23.3.5	5.0 HP, three phase	Each	22161.00
23.3.6	6.0 HP, three phase	Each	23589.00
23.3.7	7.5 HP, three phase	Each	28758.00
23.3.8	10 HP, three phase	Each	32758.00
23.3.9	12.5 HP, three phase	Each	38478.00
23.3.10	15 HP, three phase	Each	41475.00
23.4	Supplying and fixing of following sizes 'B' class G I pipe with welded steel flange of suitable size at both the end of every pipe length, fixing with submersible pump and lowering with the pump in the bore well including necessary rubber gasket, nuts & bolts etc. as per specification.		
23.4.1	100 mm dia.	Metre	883.00
23.4.2	80 mm dia.	Metre	608.00
23.4.3	65 mm dia.	Metre	393.00
23.4.4	50 mm dia.	Metre	302.00
23.4.5	40 mm dia.	Metre	228.00
23.5	Supplying and fixing of following sizes 'B' class G I pipe with all necessary Tee's, bends, sockets in the suction/ delivery line including cutting and threading etc. as per specification.		
23.5.1	100 mm dia.	Metre	904.00
23.5.2	80 mm dia.	Metre	576.00
23.5.3	65 mm dia.	Metre	454.00
23.5.4	50 mm dia.	Metre	375.00
23.5.5	40 mm dia.	Metre	264.00
23.5.6	32 mm dia.	Metre	239.00
23.5.7	25 mm dia.	Metre	212.00
23.6	Supplying and fixing following dia HDPE pipe PE-80 Grade (8kg/sqcm) in single length in the suction/ delivery line of water supply pump etc. as per specification.		
23.6.1	32 mm outer dia	Metre	47.00
23.6.2	50 mm outer dia	Metre	100.00
23.6.3	63 mm outer dia	Metre	162.00
23.7	Supplying and fixing of following sizes GM gate valve ISI mark in the suction/ delivery line etc. as per specification.		
23.7.1	100 mm dia.	Each	4554.00
23.7.2	80 mm dia.	Each	1993.00
23.7.3	65 mm dia.	Each	1167.00
23.7.4	50 mm dia.	Each	899.00
23.7.5	40 mm dia.	Each	497.00
23.7.6	32 mm dia.	Each	447.00

Code No.	Description	Unit	Rate Rs.
23.7.7	25 mm dia.	Each	387.00
23.8	Supplying and fixing of following sizes GM non return valve ISI mark in the suction/ delivery line etc. as per specification.		
23.8.1	100 mm dia.	Each	3989.00
23.8.2	80 mm dia.	Each	2507.00
23.8.3	65 mm dia.	Each	1782.00
23.8.4	50 mm dia.	Each	1059.00
23.8.5	40 mm dia.	Each	736.00
23.8.6	32 mm dia.	Each	530.00
23.8.7	25 mm dia.	Each	377.00
23.9	Supply, installation, testing and commissioning of 10-15 HP 3 phase submersible motor starter cum control wall/ floor mounted type made out of not less than 1.6 mm thick MS sheet and comprising of following panel mounting switchgears there in including connection inter-connection etc. as per specification. a) Phase indicating lamps with fuses and toggle switches 1 set b) 10/12.5/15 HP 3 phase automatic Star-delta starter with over load and no volt relay 1 No c) 32 A "C" curve TPMCB 1 No d) Voltmeter 0-500 V with selector switch 1 set e) Ammeter 0-10 A with CT's and selector switch 1 set.	Each	6933.00
23.10	Supply, installation, testing and commissioning of 5-7.5 HP 3 phase submersible motor starter cum control wall/ floor mounted type made out of not less than 1.6 mm thick MS sheet and comprising of following panel mounting switchgears there in including connection inter-connection etc. as per specification. a) Phase indicating lamps with fuses and toggle switches 1 set b) 5/7.5 HP 3 phase DOL starter with over load and no volt relay 1 No c) 32 A "C" curve TPMCB 1 No d) Voltmeter 0-500 V with selector switch 1 set e) Ammeter 0-10 A with CT's and selector switch 1 set.	Each	3529.00
23.11	Supply, installation, testing and commissioning of 1-3 HP 1 phase submersible motor starter cum control wall/ floor mounted type made out of not less than 1.6 mm thick MS sheet and comprising of following panel mounting switchgears there in including connection inter-connection etc. as per specification. a) Phase indicating lamps with fuses and toggle switches 1 set b) 1/2/3 HP 1 phase DOL starter with over load and no volt relay 1 No c) 25 A "C" curve DPMCB 1 No d) Voltmeter 0-250 V 1 set e) Ammeter 0-10 A 1 set	Each	3426.00

Code No.	Description	Unit	Rate Rs.
23.12	Supplying and fixing M.S. clamp 50 cm long made of 50mmx5mm thick M.S. Flat for holding the pipes and submerable pump set as per specification.	Metre	247.00
23.13	Supplying and fixing 300 mm dia 2 mm thick M.S. sheet cover with 3 cm edge in two past on tube well bore pipe as per specification	Each	330.00
23.14	Supplying, laying and fixing following size submersible cable along with GI/PVC/HDFC pipe line or laid in ground etc as per specification and IS : 694 (2010). Submersible cable should be rust proof, safe from oil / grease and under water chemical / Abrasion resistant.		
23.14.1	3x1.5 Sqmm	Metre	34.00
23.14.2	3x2.5 Sqmm	Metre	54.00
23.14.3	3x4.0 Sqmm	Metre	77.00
23.14.4	3x6.0 Sqmm	Metre	115.00
23.15	Supplying and making water proof joint with heat shrinkable joint kit including copper ferrules for following size of 3 core submersible copper conductor cable of 1.1 KV grade as per specification.		
23.15.1	3x1.5 Sqmm	Each	221.00
23.15.2	3x2.5 Sqmm	Each	222.00
23.15.3	3x4.0 Sqmm	Each	224.00
23.15.4	3x6.0 Sqmm	Each	383.00
23.16	Supplying and laying of approved make stainless steel wire rope of 6 mm dia for support of submersible pump set complete with tying to pump set and pump holding clamp.	Metre	14.00
23.17	Repair of Openwell Motor Parts and submersible motor parts 150 mm dia by opening/ rewinding and assembly with testing and reinstallation including etc of motor from 3 to 5 HP (3 phase)		
23.17.1	Rewinding of motor from 3 to 5 HP (3 phase) water proof copper winding wire	Job	1558.00
23.17.2	Oil seal/water seal/mechanical seal/rubber parts	Each	150.00
23.17.3	Gun metal motor bearing bus (36x50x40 to 38x50x40 size)	Each	161.00
23.17.4	Gun metal thrust bearing Axle	Each	343.00
23.17.5	Bearing housing upper	Each	349.00
23.17.6	Bearing housing Lower	Each	368.00
23.17.7	Revolving thrust Disc	Each	263.00
23.17.8	M.S. motor base	Each	359.00
23.17.9	Stainless steel rotor sleeve	Each	166.00
23.17.10	Rotor 3 to 5 HP	Each	2527.00
23.18	Repair of openwell pump parts and submersible pump parts 150 mm dia meter by opening and replacing defective part with compatible new part and assembly it with testing and re-installation including etc		
23.18.1	Stainless steel bearing sleeve	Each	137.00

Code No.	Description	Unit	Rate Rs.
23.18.2	Gun metal/ stainless steel impellers	Each	247.00
23.18.3	Gun metal/ stainless steel diffusers	Each	240.00
23.18.4	Gun metal/ stainless steel neck ring	Each	218.00
23.18.5	Gun metal/ stainless steel Bowl set	Set	174.00
23.18.6	Gun metal/ stainless steel surcleap	Each	166.00
23.18.7	Stainless steel pump shaft	Each	536.00
23.18.8	Gun metal bush	Each	166.00
23.18.9	Stainless steel sleeve	Each	101.00
23.18.10	Gun metal/ stainless steel sand guard	Each	176.00
23.18.11	Nut-bolt, strut washer & packing materials etc. complete.	Kg	330.00
23.18.12	Stainless steel coupling & key set	Set	295.00
23.18.13	NRV suitable for pumpset	Each	298.00
23.18.14	Pump tee patti	Each	122.00
23.18.15	Suction housing	Each	304.00
23.19	Repair of submersible motor parts 100 mm dia meter opening /Rewinding and assembly with testing etc complete and reinstallation including etc		
23.19.1	Rewinding of motor from 3 to 5 HP (3 phase) waterproof copper winding wire	Job	2002.00
23.19.2	Rewinding of motor from 2 HP (3 phase) waterproof copper winding wire	Job	1964.00
23.19.3	Rewinding of motor upto 2 HP (single phase) waterproof copper winding wire	Job	1852.00
23.19.4	Oil seal/water seal/mechanical seal/rubber parts waterproof copper winding wire	Job	128.00
23.19.5	Gun metal motor bearing bush	Job	134.00
23.19.6	Gun metal thrust bearing Axle	Each	240.00
23.19.7	Bearing housing upper	Each	134.00
23.19.8	Bearing housing Lower	Each	156.00
23.19.9	Revolving thrust Disc	Each	169.00
23.19.10	M.S. motor base	Each	247.00
23.19.11	Gun metal & sand guard	Each	169.00
23.19.12	S.S. coupling & key set	Set	304.00
23.19.13	Surcleap	Each	134.00
23.19.14	Nut-bolt, strut washer & packing materials etc. complete.	Kg	375.00
23.19.15	Stainless steel rotor sleeve	Each	107.00
23.19.16	Rotor up to 2 HP	Each	1552.00
23.19.17	Rotor up to 3 to 5 HP	Each	2039.00
23.20	Repair of submersible pump parts 100 mm dia by opening and replacing defective part with compalible new part & assembly it with testing and reinstallation including etc.		
23.20.1	PVC impellers	Each	97.00
23.20.2	PVC Bowl set	Each	107.00

Code No.	Description	Unit	Rate Rs.
23.20.3	PVC stage plate/impeller plate	Each	93.00
23.20.4	Stainless steel pump shaft	Each	471.00
23.20.5	Gun metal bush	Each	131.00
23.20.6	Stainless steel sleeve	Each	94.00
23.20.7	NRV suitable for pumpset	Each	240.00
23.20.8	Suction housing	Each	208.00
23.21	labour charges for repairing mono block/submersible motor including all machinery, T and P and labours etc. complete i.e. Rotor keyway repairs, machining, grinding, polishing, balancing, painting and other related works.	Job	788.00
23.22	Installation & lifting out of pump set from tubewell/sumpwell and submersible pump.		
23.22.1	Provision for lifting out unworkable submersible pump from tubewell from any depth with G.I./UPVC pipe shifting to work shop as per required suitable site.	Job	1901.00
23.22.2	Provision for dismantling unworkable openwell pumps and shifting to work shop as per required suitable site.	Job	1499.00
23.22.3	Provision for lifting out unworkable sump well pumps from any depth with and shifting to workshop as per required suitable site	Job	1298.00
23.22.4	Provision for dismantling unworkable Mono block pumps and shifting to work shop as per required suitable site.	Job	354.00
23.22.5	Provision for dismantling unworkable pressure pumps and shifting to workshop as per required suitable site.	Job	1290.00
23.23	Repairing of control panel board with replacement of contactor kit set capacitors, boost up, condenser etc complete including wiring, fitting, and testing.		
23.23.1	Single phasing preventer	Job	608.00
23.23.2	Dry run protection	Job	6878.00
23.23.3	Phase reversal protection device	Job	3506.00
23.23.4	Replacement of overload relay unit set up to 15amp.	Each	688.00
23.23.5	Replacement of overload relay unit set up to 15amp. Suitable with existing control panel board	Each	817.00
23.23.6	Replacement of starter oil with fitting and testing the starter.	Ltr	447.00
23.23.7	Replacement of Amp. Meter with fitting and testing complete.	Each	279.00
23.23.8	Replacement of Volt meter with fitting & testing complete.	Each	279.00
23.23.9	TPN MCB with box up to 32 amp. i/c fitting & testing complete.	Each	1339.00
23.23.10	Rotary switch up to 32 amp. With fitting & testing complete.	Each	503.00
23.24	Repair of monoblock pumps upto 1 HP single /three phase including replacement of required parts and labour charges for taking out and installation including transportation etc	Set	3145.00
23.25	Repair of monoblock pump upto 1.5 to 2.0 HP single/three phase including replacement of required parts and labour charges for taking out and	Set	3145.00

Code No.	Description	Unit	Rate Rs.
	installation including transportation etc		
23.26	Repair of monoblock pumps 3 to 5 HP 3 phase including replacement of required parts and labour charges for taking out and installation including transportation etc	Set	
23.27	Repair of pressure pump up to 1.5 HP single phase motor repairing and labour charges for taking out and reinstallation including transportation etc. (Replacement of required parts as per required.)		
23.27.1	Pressure switch	Each	1643.00
23.27.2	Pressure meter	Each	1218.00
23.27.3	NRV Valve set	Each	496.00
23.27.4	Air tank	Each	2864.00
23.28	Rewinding of Squirrel cage motor/mono block Motor (3 Phase) by copper enameled wire of suitable gauge including all other required greasing etc. Complete with testing including dismantling & refitting of motor at site.		
23.28.1	7.5 HP	Per Job	2843.00
23.28.2	10 HP	Per Job	3421.00
23.28.3	12.5 HP	Per Job	4384.00
23.28.4	15 HP	Per Job	4770.00
23.28.5	20 HP	Per Job	6080.00
23.28.6	25 HP	Per Job	7622.00
23.28.7	30 HP	Per Job	9009.00
23.28.8	40 HP	Per Job	11552.00
23.29	Rewinding of Submersible Motor (3 Phase) by copper enameled wire of suitable gauge including all other required material i.e. B class insulation varnish, connection leads, oiling greasing etc complete with testing including dismantling & refitting of motor at site.		
23.29.1	7.5 HP	Per Job	2394.00
23.29.2	12 HP	Per Job	3357.00
23.30	Supplying, installation, testing and commissioning of Pressure pump set suitable for single phase, 230 volts AC supply including connection of suction and delivery line etc. as per specification.		
23.30.1	0.60 HP single phase	Each	12873.00
23.30.2	0.80 HP single phase	Each	15972.00
23.30.3	1.00 HP single phase	Each	17094.00
23.30.4	1.50 HP single phase	Each	18346.00
23.31	Supplying ,Installation , Testing , Commissioning of Vertical position submersible sewage dewatering unclog pump set for capacity 50 HP / 1450 RPM , AC 3 PH , 440V , 50 HZ having 200 MM delivery , Head 20 meter , Discharge 6000 LPM with Cutter Plate , Sewage / Solid handling capacity Size 100 MM along with control Panel ,15 Meter 200 MM PVC hose , C.I.	Set	736721.00

Code No.	Description	Unit	Rate Rs.
	bends and 15 Meter Submersible cable etc.		
23.32	Supplying ,Installation , Testing , Commissioning of Vertical position submersible sewage dewatering unclog pump set for capacity 30 HP / 1450 RPM , AC 3 PH , 440V , 50 HZ having 150 MM delivery , Head 18 meter , Discharge 4000 LPM with Cutter Plate , Sewage / Solid handling capacity Size 100 MM along with control Panel ,15 Meter 150 MM PVC hose , C.I. bends and 15 Meter Submersible cable etc.	Set	549256.00
23.33	Supplying ,Installation , Testing , Commissioning of Vertical position submersible sewage dewatering unclog pump set for capacity 20 HP / 1450 RPM , AC 3 PH , 440V , 50 HZ having 150 MM delivery , Head 15 meter , Discharge 4000 LPM with Cutter Plate , Sewage / Solid handling capacity Size 100 MM along with control Panel ,15 Meter 100 MM PVC hose , C.I. bends and 15 Meter Submersible cable etc.	Set	417599.00
23.34	Supplying ,Installation , Testing , Commissioning of Vertical position submersible sewage dewatering unclog pump set for capacity 10 HP / 1450 RPM , AC 3 PH , 440V , 50 HZ having 100 MM delivery , Head 14 meter , Discharge 1400 LPM with Cutter Plate , Sewage / Solid handling capacity Size 40 MM along with control Panel ,15 Meter 100 MM PVC hose , C.I. bends and 15 Meter Submersible cable etc.	Set	255128 .00
23.35	Supplying ,Installation , Testing , Commissioning of Vertical position submersible sewage dewatering unclog pump set for capacity 05 HP / 1450 RPM , AC 3 PH , 440V , 50 HZ having 100 MM delivery , Head 10 meter , Discharge 650 LPM with Cutter Plate , Sewage / Solid handling capacity Size 40 MM along with control Panel ,15 Meter 100 MM PVC hose , C.I. bends and 15 Meter Submersible cable etc.	Set	195437.00

CHAPTER 24 – AIR CONDITIONER (WT/ Split)

All works shall be carried out as per item of work and as per relevant BIS specifications and additional specifications attached with tender documents:

(A) MEASUREMENT:

The items no 24.10 and 24.12 shall be measured on linear basis along pipe in metre with least count 1 cm and all other items shall be measured in by counting in numbers.

(B) RATE: Cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
24.1	Supplying of approved make window type Air Conditioner unit as per specification.		
24.1.1	1.0 ton capacity 3000 kcal / hr (3 star).	Each	17380.00
24.1.2	1.5 ton capacity 4500 kcal / hr (3 star).	Each	20018.00
24.1.3	1.0 ton capacity 3000 kcal / hr (5 star).	Each	20474.00
24.1.4	1.5 ton capacity 4500 kcal / hr (5 star).	Each	23605.00
24.2	Installation of window type Air Conditioner unit in existing window/ opening including providing and fixing necessary good quality wooden support frame of size 38 mm x 75 mm and 12mm ply wood to cover left out space of window, testing and commissioning etc, as per specification.	Each	482.00
24.3	Supplying of approved make split type Air Conditioner unit with cooling unit (copper coil) and condensing unit (copper coil) including 5 years compressor warranty and standard length of upto 3 metre of copper piping with insulation, etc complete as per specification:		
24.3.1	1.0 ton split type capacity 3000 kcal / hr (3 star).	Each	24086.00
24.3.2	1.5 ton split type capacity 4500 kcal / hr (3 star).	Each	28369.00
24.3.3	2.0 ton split type capacity 6000 kcal / hr (3 star).	Each	40810.00
24.3.4	1.0 ton split type capacity 3000 kcal / hr (5 star).	Each	27940.00
24.3.5	1.5 ton split type capacity 4500 kcal / hr (5 star).	Each	33352.00
24.3.6	2.0 ton Cassette split type capacity 6000 kcal / hr.	Each	70975.00
24.3.7	3.0 ton Cassette split type capacity 9000 kcal / hr.	Each	96260.00
24.4	Installation of split type Inverter/Non Inverter Air Conditioner unit, cooling unit on wall inside and condensing unit on out side wall/ ceiling/ floor at desired locations with existing standard length of copper piping with insulation and power cable including providing and fixing necessary good quality powder coated MS frame etc complete as per specification. (Extra length of copper piping and power cable shall be paid extra on linear basis)	Each	1794.00

Code No.	Description	Unit	Rate Rs.
24.5	Installation of cassette type Air Conditioner unit, cooling unit inside and condensing unit on out side wall/ ceiling/ floor at desired locations with existing standard length of copper piping with insulation and power cable including providing and fixing necessary good quality powder coated MS frame etc complete as per specification. (Extra length of copper piping and power cable shall be paid extra on linear basis)	Each	3747.00
24.6	Supplying and fixing of approved make ductable split type Air Conditioner unit with single/ multi compressure unit and fixing cooling unit (copper coil) at desired location with hanging/ fixing arrangement, condensing unit (copper coil) on out side wall/ ceiling/ floor at desired location having standard length of/ upto 3 metre of copper piping with insulation and drainage pipe upto 1.5 metre length, necessary wiring but excluding ducting work etc complete as per specification with 5 years compressor warranty.		
24.6.1	5.0/5.5 ton capacity	Each	115295.00
24.6.2	7.5/8.0 ton capacity	Each	156830.00
24.6.3	11.0 ton capacity	Each	223202.00
24.6.4	16.5/17.0 ton capacity	Each	313661.00
24.7	Supply and fixing of approved make wall mounting type voltage stabilizer with input volts 160-250, output volts 200-240 volts and double step relay on desired location with necessary fixing material including connection etc complete as per specification.		
24.7.1	4 KVA	Each	3257.00
24.7.2	5 KVA	Each	3712.00
24.8	Dismantaling, Shifting, Re-installation, testing and commissioning of split type Air Conditioner unit with indoor and out door units and frames at desired locations with existing length of copper piping with insulation, necessary wiring with existing cable etc complete as per specification.	Each	2677.00
24.9	Dismantaling, Shifting, Re-installation, testing and commissioning of Window type Air Conditioner unit at desired location with necessary wiring with existing cable etc complete as per specification.	Each	1070.00
24.10	Supply, connecting and fixing extra length of copper piping for split type air conditioners of following dia and approved quality with insulation sleeve etc complete as per specification		
24.10.1	5/8 "	Metre	319.00
24.10.2	1/2 "	Metre	205.00
24.10.3	1/4 "	Metre	159.00
24.11	Supplying and fixing good quality powder coated MS frame for installation of out door unit of split type Air Conditioner at desired location with atleast 6 nos steel fastners etc complete as per specification	Set	370.00
24.12	Supplying, connecting and fixing 15mm dia PVC flexible drain pipe (reinforced with nylon threads) in drain outlet of split type air conditioners	Metre	12.00

Code No.	Description	Unit	Rate Rs.
	etc complete as per specification		
24.13	Servicing of window type air conditioner unit of all capacity by cleaning of cooling and condensing coils, filters, grills and other parts, oiling/ greasing of fan motor including testing etc as per specification.	Each	354.00
24.14	Servicing of split-type air conditioner unit of all capacity by cleaning of cooling and condensing units, filters, grills and other parts, oiling/ greasing of fan motor including testing etc as per specification.	Each	514.00
24.15	Replacing the burnt/ wornout sealed compressor of Window/ split type AC unit with company repaired compressor including filling of refrigerant testing for leakage, testing and commissioning of AC unit etc as per specification.		
24.15.1	1.5 ton window type AC	Each	6788.00
24.15.2	2.0 ton window type AC	Each	7319.00
24.15.3	1.5 ton split type AC	Each	7166.00
24.15.4	2.0 ton split type AC	Each	7698.00
24.16	Supply and filling for topping up required quantity of R-22/R-32/R-410 refrigerant in existing window/ split air conditioners as per manufacturers specification including checking for leakage before and after filling etc complete as per specification.		
24.16.1	1.5 ton window type AC	Each	262.00
24.16.2	2.0 ton window type AC	Each	268.00
24.16.3	1.5 ton split type AC	Each	320.00
24.16.4	2.0 ton split type AC	Each	336.00
24.17	Supply and filling up required quantity of R-22/R-32/R-410 refrigerant in existing window/ split air conditioners as per manufacturers specification including checking for leakage before and after filling, flushing the line with R-22/R-32/R-410 etc complete as per specification.		
24.17.1	1.5 ton window type AC	Each	684.00
24.17.2	2.0 ton window type AC	Each	728.00
24.17.3	1.5 ton split type AC	Each	799.00
24.17.4	2.0 ton split type AC	Each	844.00
24.18	Supplying, fixing, testing and commissioning of following 440 volts capacitors in WT/ Split / Tower airconditioners at all locations as per specification.		
24.18.1	36 MFD	Each	429.00
24.18.2	45 MFD	Each	450.00
24.18.3	50 MFD	Each	397.00
24.18.4	60 MFD	Each	496.00
24.19	Supplying and replacing following spares/ accessories in window/ split AC		
24.19.1	Electronic control PCB for WT/AC	Each	1001.00
24.19.2	Electronic control PCB for Split/AC	Each	1259.00
24.19.3	Digital Display Unit for WT/Split AC	Each	1516.00

Code No.	Description	Unit	Rate Rs.
24.19.4	Blower motor for indoor unit of Split AC	Each	1301.00
24.19.5	Fan motor for outdoor unit of Split AC	Each	1472.00
24.19.6	Fan motor blade for outdoor unit of Split AC	Each	530.00
24.19.7	Swing motor for WT/ Split AC	Each	402.00
24.19.8	Remote for WT/ split AC	Each	336.00
24.19.9	Dead Nut 1/4"	Each	53.00
24.19.10	Dead Nut 1/2"	Each	61.00
24.19.11	Dead Nut 5/8"	Each	78.00
24.20	Supplying of approved make Hiwall split Inverter type Air Conditioner unit with cooling unit (copper coil) and condensing unit (copper coil) including 5 years compressor warranty and standard length of upto 5 metre of copper piping with insulation etc complete as per specification:		
24.20.1	1.0 Ton split type Inverter AC {3 Star}	Each	28117.00
24.20.2	1.5 Ton split type Inverter AC {3 Star}	Each	34304.00
24.20.3	2.0 Ton split type Inverter AC {3 Star}	Each	43322.00
24.20.4	1.0 Ton split type Inverter AC {4 Star}	Each	31172.00
24.20.5	1.5 Ton split type Inverter AC {4 Star}	Each	36564.00
24.20.6	2.0 Ton split type Inverter AC {4 Star}	Each	44576.00
24.20.7	1.0 Ton split type Inverter AC {5 Star}	Each	33972.00
24.20.8	1.5 Ton split type Inverter AC {5 Star}	Each	38539.00
24.20.9	2.0 Ton split type Inverter AC {5 Star}	Each	47456.00
24.21	Supplying, installation, testing and commissioning of following size {storage volume } domestic refrigerator with BEE star rating,copper coil and eco friendly refrigerant, suitable puff insulation, built in voltage stabilizer and power saver compressor, conformity to IS: 1476, including all accessories connection etc complete as per specification.		
24.21.1	190 ltr.	Each	12339.00
24.21.2	260 ltr.	Each	17736.00
24.21.3	360 ltr.	Each	38230.00
24.21.4	410 ltr.	Each	42231.00
24.22	Providing of Core cut with suitable size as per specification at site.	Cu. Inch	4.00
24.23	Supplying, installation, testing and commissioning of following size drinking water cooler storage type ISI marked, eco friendly non CFC refrigerant, water tank and cooler cabinet sheet material- stainless steel {grade AISI 304} with thickness>= 0.8 mm, with PUF insulation including all accessories connection etc complete as per specification.		
24.23.1	40/80 Ltrs/hr	Each	25478.00
24.23.2	60/120 Ltrs/hr	Each	29394.00
24.23.3	150/150 Ltrs/hr	Each	40433.00
24.23.4	150/300 Ltrs/hr	Each	53180.00

Code No.	Description	Unit	Rate Rs.
24.24	Supplying, installation, testing and commissioning of following capacity of RO purification system with UF/UV/TDS controller and UV lamp {IS 14724 Ultra violet disinfection} and minimum three stage purification, automatic on/off, output water conforming standard IS 10500 with inbuilt storage tank including all accessories connection etc complete as per specification.		
24.24.1	25 Ltrs/hr output capacity	Each	19982.00
24.24.2	50 Ltrs/hr output capacity	Each	33168.00
24.25	Supplying and fixing of approved make Tower Air Conditioner unit with cooling unit and condensing unit with copper coil including standard length of upto 3 metre of copper piping with insulation etc complete as per specification.		
24.25.1	2.0 TR	Each	50181.00
24.25.2	3.0 TR	Each	65486.00
24.25.3	4.0 TR	Each	80791.00
24.26	Supplying and fixing wall mounted storage/instantaneous type electric geyser, complete with inner copper container, heating element, thermostat, indicating lamp including inlet / outlet water pipe connection, electric connection testing and commissioning etc. as per specification.		
24.26.1	1 Ltr Capacity Instantaneous water geyser 5 star	Each	1644.00
24.26.2	3 Ltr Capacity Instantaneous water geyser 5 star	Each	2190.00
24.26.3	6 Ltr Capacity Instantaneous water geyser 5 star	Each	3375.00
24.26.4	15 Ltr. Capacity storage type geyser 4 star	Each	3566.00
24.26.5	25 Ltr. Capacity storage type geyser 4 star	Each	4057.00
24.26.6	6 Ltr. Capacity storage type geyser 5 star	Each	4134.00
24.26.7	10 Ltr. Capacity storage type geyser 5 star	Each	4939.00
24.26.8	15 Ltr. Capacity storage type geyser 5 star	Each	5651.00
24.26.9	25 Ltr. Capacity storage type geyser 5 star	Each	6504.00
24.27	Installation, testing and commissioning of wall mounted storage type electric geyser including inlet / outlet water pipe connection, electric connection etc. as per specification.	Each	162.00
24.28	Annual servicing of window type air conditioners unit of all capacity by cleaning of cooling and condensing coils, filters, grills and other parts, oiling/ greasing of fan motor , checking for leakage including testing and gas charging etc complete as per specification	Each	1673.00
24.29	Annual servicing of split- type (inverter and non inverter) air conditioners unit of all capacity by cleaning of cooling and condensing coils, filters, grills and other parts, oiling/ greasing of fan motor , checking for leakage including testing and gas charging etc complete as per specification	Each	1986.00
24.30	Providing and replacing set of 3 nos wiremesh and 3 Nos wood wool/ Khas pads of size upto 55cm x 75cm (NS) of air cooler etc complete.	Set	180.00

Code No.	Description	Unit	Rate Rs.
24.31	Repainting of air cooler by scraping of old paint, making surface even, painting with red oxide primer & two coats of enamel paint of required shade complete.	Each	265.00
24.32	Providing and replacing burnt/ damaged with new water pump in existing air cooler etc complete.	Each	169.00
24.33	Supply, Installation , testing and commisioning of 5000 Cubic meter per hour Jumbo Plastic Body Cooler Including Floor Standing caster wheels ,Synthetic Honeycomb pads , Sump Tank Capacity (minimum) 100 Litres , minimum Thickness of Body of the Plastic Cooler should be 2 millimeter, Drain Plug material Plastic / Rubber,Fan Size 450 mm ,Blade Material High Impact Plastic, Minimum number of steps for fan speed control should be 3 , Power Factor 0.9 or Better,Thickness of Synthetic Honeycomb pads Filter should be 15 mm or above, Location of the Water Collecting Chamber At the Bottom , ,Minimum length of connecting cable with 3-pin moulded Plug Top 5/6 Amps rating should be 2.5 meter etc complete with all fitting accessorries and supports as required.	Each	12674.00
24.34	Supply, Installation , testing and commisioning of 1800 Cubic meter per hour Nominal air delivery Plastic body desert Cooler Including Floor Standing caster wheels ,Synthetic Honeycomb pads , Sump Tank Capacity (minimum) 36 Litres , minimum Thickness of Body of the Plastic Cooler should be 2 millimeter,Drain Plug material Plastic / Rubber,Fan Size 350mm ,Blade Material High Impact Plastic , Minimum number of steps for fan speed control should be 3 , Power Factor 0.9 or Better,Thickness of Synthetic Honeycomb pads Filter should be 15 mm or above, Location of the Water Collecting Chamber At the Bottom , Minimum length of connecting cable with 3-pin moulded Plug Top 5/6 Amps rating should be 2.5 meter etc complete with all fitting accessories and supports as required.	Each	7627.00
24.35	Supply , Installation , testing and commissioning of 1800 Cubic meter per hour Nominal Air Delivery Window Air Cooler without caster wheels including Wood wool pads , Sump Tank Capacity (minimum) 36 Liters ,Material of Filter panel, Grill,Top of cooler body, cabinet, sump tank should be of Galvanized steel sheet (ISI marked to IS 277 latest) with zinc coating not less than 100 gms/sq.meter ,Sheet Thickness (nominal) for Filter panel, Grill, Top of cooler body, cabinet - 0.8 mm , Sump Tank Sheet Thickness (nominal) 1.0 mm , All internal surfaces of Steel Body Cooler Painted with Water Resistant paint ,Drain Plug material Brass / SS Fan Size 380 mm , Minimum number of steps for fan speed control should be 3 , Power Factor 0.9 OR BETTER,Thickness of Filter Pad 15 mm or above Non-corrosive Wire Guard for Filter Pads,Location of the Water Collecting Chamber At the Bottom , Minimum length of connecting cable with 3-pin moulded Plug Top 5/6 Amps rating should be 2.5 meter etc complete with all fitting accessorries and supports as required.	Each	7325.00

CHAPTER 25 - HVAC

All works shall be carried out as per item of work and CPWD specifications for Air Conditioning Works using material as specified by the manufacturers of that item, as per relevant BIS specifications and as per additional specifications attached with tender documents:

(A) MEASUREMENT:

Item no 25.1, 25.2, 25.3, 25.25, 25.36 shall be measured in on linear basis in length at the center line of pipe line in metres correct to 1 cm.

Item no 25.4, 25.5, 25.6, 25.28 to 25.36, 25.37 to 25.42 the surface area shall be measured in length and breadth/ height in metre correct to 1cm and then area will be calculated in Sqm correct to 2 decimal.

Item no 25.7,25.8,25.9, 25.18,25.23,25.24, 25.26.1, 25.26.3, 25.43, 25.44 shall be measured in by counting in numbers.

(B) RATE: The rate of items includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
25.1	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with 80 kg/cum density resin bonded fiber glass or 144 kg /cu m density mineral wool pipe section insulation covered with a layer of 120 gm/Sqm polythene sheet (vapour barrier) and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date) at joints and repairing of damage to building etc. as per specifications and as per specification. Note: The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.		
25.1.1	600mm dia. (75mm insulation)	Metre	13449.00
25.1.2	550mm dia. (75mm insulation)	Metre	12668.00
25.1.3	500mm dia. (75mm insulation)	Metre	11755.00
25.1.4	450mm dia. (75mm insulation)	Metre	11220.00
25.1.5	400mm dia. (75mm insulation)	Metre	10679.00
25.1.6	350mm dia. (75mm insulation)	Metre	9419.00
25.1.7	300mm dia. (75mm insulation)	Metre	7653.00
25.1.8	250mm dia. (75mm insulation)	Metre	6566.00
25.1.9	200mm dia. (75mm insulation)	Metre	5799.00
25.1.10	150mm dia. (50mm insulation)	Metre	3885.00
25.1.11	125mm dia. (50mm insulation)	Metre	3138.00

25.1.12	100mm dia. (50mm insulation)	Metre	2824.00
25.1.13	80mm dia. (50mm insulation)	Metre	2279.00
25.1.14	65mm dia. (50mm insulation)	Metre	1901.00
25.1.15	50mm dia. (50mm insulation)	Metre	1485.00
25.1.16	40mm dia. (50mm insulation)	Metre	1109.00
25.1.17	32mm dia. (50mm insulation)	Metre	1040.00
25.1.18	25mm dia. (50mm insulation)	Metre	885.00
25.1.19	20mm dia. (50mm insulation)	Metre	625.00
25.1.20	15mm dia. (50mm insulation)	Metre	387.00
25.2	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of class 'O' insulation minimum 45 Kg per Cum density and thermal conductivity 0.037 W/mK or better at 20 deg.centigrad applied by adhesive confirming to standard specifications and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date) at joints and repairing of damage to building etc. as per specifications and as per specification complete in all respect. Note:-The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.		
25.2.1	600mm dia. (32 mm thick insulation)	Metre	12989.00
25.2.2	550mm dia. (32 mm thick insulation)	Metre	12271.00
25.2.3	500mm dia. (32 mm thick insulation)	Metre	11413.00
25.2.4	450mm dia. (32 mm thick insulation)	Metre	10932.00
25.2.5	400mm dia. (32 mm thick insulation)	Metre	9961.00
25.2.6	350mm dia. (32 mm thick insulation)	Metre	8566.00
25.2.7	300mm dia. (32 mm thick insulation)	Metre	6960.00
25.2.8	250mm dia. (32 mm thick insulation)	Metre	6079.00
25.2.9	200mm dia. (32 mm thick insulation)	Metre	5308.00
25.2.10	150mm dia. (32 mm thick insulation)	Metre	3583.00
25.2.11	125mm dia. (32 mm thick insulation)	Metre	3044.00
25.2.12	100mm dia. (32 mm thick insulation)	Metre	2667.00
25.2.13	80mm dia. (32 mm thick insulation)	Metre	2066.00
25.2.14	65mm dia. (32 mm thick insulation)	Metre	1724.00
25.2.15	50mm dia. (32 mm thick insulation)	Metre	1356.00
25.2.16	40mm dia. (32 mm thick insulation)	Metre	1050.00
25.2.17	32mm dia. (19 mm thick insulation)	Metre	885.00
25.2.18	25mm dia. (19 mm thick insulation)	Metre	756.00

25.2.19	20mm dia. (19 mm thick insulation)	Metre	559.00
25.2.20	15mm dia. (19 mm thick insulation)	Metre	351.00
25.3	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping plumbing inside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with fire retardant quality expanded polystyrene moulded pipe section of density 20 kg/cu.m after a thick coat of cold setting adhesive (CPRX compound) wrapping with 500g polythene faced hessain and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date) at joints repairing of damage to building etc. as per specifications and as per specification complete in all respect. Note:-The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.		
25.3.1	600mm dia. (75 mm insulation)	Metre	12676.00
25.3.2	550mm dia. (75 mm insulation)	Metre	12101.00
25.3.3	500mm dia. (75 mm insulation)	Metre	11195.00
25.3.4	450mm dia. (75 mm insulation)	Metre	10923.00
25.3.5	400mm dia. (75 mm insulation)	Metre	9798.00
25.3.6	350mm dia. (75 mm insulation)	Metre	8356.00
25.3.7	300mm dia. (75 mm insulation)	Metre	6843.00
25.3.8	250mm dia. (75 mm insulation)	Metre	6014.00
25.3.9	200mm dia. (75 mm insulation)	Metre	5231.00
25.3.10	150mm dia. (50 mm insulation)	Metre	3506.00
25.3.11	125mm dia. (50mm insulation)	Metre	2911.00
25.3.12	100mm dia. (50mm insulation)	Metre	2570.00
25.3.13	80mm dia. (50mm insulation)	Metre	2003.00
25.3.14	65mm dia. (50mm insulation)	Metre	1541.00
25.3.15	50mm dia. (50mm insulation)	Metre	1187.00
25.3.16	40mm dia. (50mm insulation)	Metre	890.00
25.3.17	32mm dia. (50mm insulation)	Metre	723.00
25.3.18	25mm dia. (50mm insulation)	Metre	601.00
25.3.19	20mm dia. (50mm insulation)	Metre	520.00
25.3.20	15mm dia. (50mm insulation)	Metre	370.00
25.4	Supplying, laying/ fixing of following thickness resin bonded fiber glass pipe section insulation having density 80 kg/cum duly covered with a layer of 120 gm/Sqm polythene sheet (vapour barrier) on existing pipe and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date)		

	at joints etc. as per specification.		
25.4.1	75mm	Sqm	1754.00
25.4.2	50mm	Sqm	1531.00
25.4.3	40mm	Sqm	1445.00
25.4.4	25mm	Sqm	1230.00
25.5	Supplying, laying/ fixing of following thickness closed cell elastometric nitrile rubber of class 'O' applied by adhesive confirming to standard specifications and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date) at joints etc. as per specification complete in all respect.		
25.5.1	32mm	Sqm	1029.00
25.5.2	19mm	Sqm	734.00
25.6	Supplying, laying/ fixing of following thickness insulation with fire retardant quality expanded polystyrene moulded pipe section of density 20 kg/cu.m after a thick coat of cold setting adhesive (CPRX compound) wrapping with 500g polythene faced hessain and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date) at joints repairing etc. as per specification complete in all respect.		
25.6.1	75mm	Sqm	1125.00
25.6.2	50mm	Sqm	967.00
25.7	Supplying, fixing, testing and commissioning of following size BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.7.1	600 mm dia	Each	57435.00
25.7.2	550 mm dia	Each	53753.00
25.7.3	500 mm dia	Each	51408.00
25.7.4	450 mm dia	Each	36256.00
25.7.5	400 mm dia	Each	28097.00
25.7.6	350 mm dia	Each	19937.00
25.7.7	300 mm dia	Each	14702.00
25.7.8	250 mm dia	Each	13317.00
25.7.9	200 mm dia	Each	8526.00
25.7.10	150mm dia.	Each	4692.00
25.7.11	125mm dia.	Each	4043.00
25.7.12	100mm dia.	Each	3718.00
25.7.13	80mm dia.	Each	2587.00
25.7.14	65mm dia.	Each	2335.00
25.7.15	50mm dia.	Each	2125.00
25.7.16	40mm dia.	Each	1867.00

25.8	Supplying, fixing, testing and commissioning of following size Motorised BUTTERFLY VALVE with C I body SS Disc, Nitrile Rubber Seal & O-Ring PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported. Conforming to BS 5155, IS 13095, with IP -55 actuator, capable of accepting upto 10 V DC, and upto 20 mA electric signal and providing similar transduced feedback output to control system as per specification.		
25.8.1	600 mm dia	Each	176253.00
25.8.2	550 mm dia	Each	161259.00
25.8.3	500 mm dia	Each	143663.00
25.8.4	450 mm dia	Each	109228.00
25.8.5	400 mm dia	Each	99652.00
25.8.6	350 mm dia	Each	88221.00
25.8.7	300 mm dia	Each	78677.00
25.8.8	250 mm dia	Each	54594.00
25.8.9	200 mm dia	Each	41772.00
25.8.10	150mm dia.	Each	31643.00
25.8.11	125mm dia.	Each	30801.00
25.8.12	100mm dia.	Each	30061.00
25.8.13	80mm dia.	Each	13494.00
25.9	Supplying, fixing, testing and commissioning of following size BALANCING VALVE WITH BUILT IN MEASURING FACILITY with C I body flanged construction with EPDM (Ethylene Propylene diene monomer) coated disc with long pitch with protected out pipe insulation & PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.9.1	600 mm dia	Each	303566.00
25.9.2	550 mm dia	Each	278442.00
25.9.3	500 mm dia	Each	267819.00
25.9.4	450 mm dia	Each	226986.00
25.9.5	400 mm dia	Each	182035.00
25.9.6	350 mm dia	Each	150417.00
25.9.7	300 mm dia	Each	80990.00
25.9.8	250 mm dia	Each	58757.00
25.9.9	200mm dia	Each	38383.00
25.9.10	150mm dia.	Each	18719.00
25.9.11	125mm dia.	Each	12782.00
25.9.12	100mm dia.	Each	9177.00
25.9.13	80mm dia.	Each	5676.00
25.9.14	65 mm dia	Each	5449.00

25.9.15	50mm dia.	Each	4908.00
25.9.16	40 mm dia	Each	2362.00
25.9.17	32 mm dia	Each	1685.00
25.9.18	25 mm dia	Each	1346.00
25.9.19	20 mm dia	Each	1239.00
25.10	Supplying, fixing, testing and commissioning of following size NON - RETURN VALVE with duel plate of C I body SS plates vulcanized NBR seal flanged end & PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.10.1	400 mm dia	Each	43569.00
25.10.2	350 mm dia	Each	31912.00
25.10.3	300 mm dia	Each	17999.00
25.10.4	250 mm dia	Each	11546.00
25.10.5	200 mm dia	Each	7262.00
25.10.6	150mm dia.	Each	4677.00
25.10.7	125mm dia.	Each	3596.00
25.10.8	100mm dia	Each	2636.00
25.10.9	80mm dia.	Each	1893.00
25.10.10	65mm dia	Each	1598.00
25.11	Supplying, fixing, testing and commissioning of following size BALL VALVE (without stainer) with brass body, PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.11.1	32 mm dia	Each	1022.00
25.11.2	25 mm dia	Each	640.00
25.11.3	20 mm dia	Each	558.00
25.11.4	15 mm dia	Each	342.00
25.12	Supplying, fixing, testing and commissioning of following size SET OF BALL VALVES (one ball valve with strainer and one ball valve without strainer) with brass body, PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.12.1	25 mm dia	Each	753.00
25.12.2	20 mm dia	Each	462.00
25.13	Supplying, fixing, testing and commissioning of following size AUTO AIR VENT (with ball valve) with brass body, PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.13.1	25 mm dia	Each	910.00
25.13.2	20 mm dia	Each	787.00
25.13.3	15 mm dia	Each	706.00

25.14	Supplying, fixing, testing and commissioning of following size MANUAL AIR VENT (with ball valve) with brass body, PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.14.1	25 mm dia	Each	701.00
25.14.2	20 mm dia	Each	576.00
25.14.3	15 mm dia	Each	462.00
25.15	Supplying, fixing, testing and commissioning of following size Ball valve for Chilled water drain out with brass body, PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.15.1	32 mm dia	Each	981.00
25.15.2	25 mm dia	Each	740.00
25.15.3	15 mm dia	Each	462.00
25.16	Supplying, fixing, testing and commissioning of following size Descaling valve with brass body, PN 16 pressure rating for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.16.1	15 mm dia	Each	382.00
25.17	Supplying, fixing, testing and commissioning of water flow switch for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.	Each	2112.00
25.18	Supplying, fixing, testing and commissioning of following size Y-STRAINER of Ductile CI Body flanged ends with stainless steel strainer for for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.18.1	300mm dia	Each	27171.00
25.18.2	250mm dia	Each	20138.00
25.18.3	200mm dia	Each	16386.00
25.18.4	150mm dia.	Each	7758.00
25.18.5	125mm dia.	Each	7289.00
25.18.6	100mm dia	Each	4888.00
25.18.7	80mm dia	Each	3550.00
25.18.8	65mm dia.	Each	3137.00
25.18.9	50mm dia.	Each	2491.00
25.18.10	40mm dia.	Each	1725.00
25.18.11	32mm dia.	Each	1357.00
25.18.12	25mm dia.	Each	1160.00
25.19	Supplying, fixing, testing and commissioning of following size Suction Guide cum Strainer {with SS Jali 130 Mesh } of Ductile CI Body flanged ends with stainless steel strainer for for chilled water/ hot water line duly		

	insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.19.1	400mm dia	Each	52255.00
25.19.2	350mm dia	Each	37531.00
25.19.3	300mm dia	Each	24140.00
25.19.4	250mm dia	Each	21217.00
25.19.5	200mm dia	Each	20330.00
25.19.6	150mm dia.	Each	14096.00
25.19.7	125mm dia.	Each	11477.00
25.19.8	100mm dia	Each	8926.00
25.19.9	80mm dia	Each	6623.00
25.20	Supplying, fixing, testing and commissioning of following size Pot Strainers {with SS Jali 130 mesh} of Ductile CI Body flanged ends with stainless steel strainer for chilled water/ hot water line duly insulated to the same specifications as the connected piping and adequately supported as per specifications.		
25.20.1	450mm dia	Each	127411.00
25.20.2	400mm dia	Each	101885.00
25.20.3	350mm dia	Each	74902.00
25.20.4	300mm dia	Each	72086.00
25.21	Supplying, fixing, testing and commissioning of following size Flexible connection at pump and WCM connection for chilled water/ hot water line duly insulated and adequately supported as per specifications.		
25.21.1	350mm dia	Each	18943.00
25.21.2	300mm dia	Each	16012.00
25.21.3	250mm dia	Each	13027.00
25.21.4	200mm dia	Each	8535.00
25.21.5	150mm dia.	Each	6541.00
25.21.6	125mm dia.	Each	5846.00
25.21.7	100mm dia	Each	5137.00
25.22	SITC of Dynamic Balancing Cum Flow Control Valves with digital thermostat along with suitable flanges, reducers, adapters, gaskets nipples etc. Valve shall be electronic, dynamic, modulating, 2 way, control device. Maximum flow setting shall be adjustable to 51 different setting within the range of the valve size. It shall be digital thermostat or BMS compatible. Valve actuator housing shall be rated to IP44. Actuator shall be driven by 24 VDC motor and shall accept 2010 VDC, 4-20mA, 3-point floating or pulse width modulation electric signal and shall include resistor to facilitate any of these signals. Actuator shall be capable of providing 4-20mA or 2-10VDC feedback signal to control system. Optional fail safe system to power valve to either open of closed position from any position	Nos.	

in case of power failure shall be available. Provide necessary power transfer/ converter for 240 Volt to 24 Volt. Extended LED read – out of current valve position and maximum valve position setting shall be standard.

25.22.1	150 mm dia	Nos.	120533.00
25.22.2	125 mm dia	Nos.	107736.00
25.22.3	100 mm dia	Nos.	90240.00
25.22.4	80 mm dia	Nos.	80270.00
25.22.5	65 mm dia	Nos.	71811.00
25.22.6	50 mm dia	Nos.	38578.00
25.22.7	40 mm dia	Nos.	32721.00
25.22.8	32 mm dia	Nos.	24534.00
25.22.9	25 mm dia	Nos.	21770.00
25.23	Providing and fixing in position the industrial type pressure gauges with gun metal / brass valves, needle valve and syphon tube complete as per specification	Each	630.00
25.24	Providing & fixing in position the mercury in glass industrial type thermometers with thermowell	Each	458.00
25.25	Supplying, fixing, testing and commissioning of CONDENSER WATER PIPES of following sizes of MS 'C' class along with necessary clamps, vibration isolators and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as per specification complete in all respect. Note:-The Pipes size 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. And from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.		
25.25.1	600mm dia.	Metre	10853.00
25.25.2	550mm dia.	Metre	9899.00
25.25.3	500mm dia.	Metre	8904.00
25.25.4	450mm dia.	Metre	8281.00
25.25.5	400mm dia.	Metre	7427.00
25.25.6	350mm dia	Metre	5639.00
25.25.7	300mm dia.	Metre	3876.00
25.25.8	250mm dia	Metre	3455.00
25.25.9	200mm dia.	Metre	3000.00
25.25.10	150mm dia.	Metre	2135.00
25.25.11	125mm dia.	Metre	1802.00
25.25.12	100mm dia.	Metre	1521.00
25.25.13	80mm dia.	Metre	1284.00

25.25.14	65mm dia.	Metre	1044.00
25.25.15	50mm dia.	Metre	813.00
25.25.16	40mm dia.	Metre	633.00
25.25.17	32mm dia.	Metre	578.00
25.25.18	25mm dia.	Metre	446.00
VALVE WITHOUT INSULATION			
25.26	Supplying, fixing, testing and commissioning of following Valves, gauges and strainers for condenser water circulation as per specifications.		
25.26.1	BUTTERFLY VALVE {MANUAL} with C I Body SS disc nitrile sheet & O-ring & PN 16 pressure rating as specified		
25.26.1.1	600 mm dia	Each	56702.00
25.26.1.2	550 mm dia	Each	52345.00
25.26.1.3	500 mm dia	Each	50056.00
25.26.1.4	450 mm dia	Each	35604.00
25.26.1.5	400 mm dia	Each	27465.00
25.26.1.6	350 mm dia	Each	22956.00
25.26.1.7	300 mm dia	Each	19972.00
25.26.1.8	250 mm dia	Each	16988.00
25.26.1.9	200 mm dia	Each	8537.00
25.26.1.10	150mm dia.	Each	4675.00
25.26.1.11	125mm dia.	Each	4257.00
25.26.1.12	100mm dia.	Each	3590.00
25.26.1.13	80mm dia.	Each	2409.00
25.26.1.14	65mm dia.	Each	2047.00
25.26.1.15	50mm dia.	Each	1855.00
25.26.1.16	40mm dia.	Each	1552.00
25.26.2	Supplying, fixing, testing and commissioning of following size Motorised BUTTERFLY VALVE with C I body SS Disc, O- Ring and minimum PN 16 pressure rating, conforming to BS 5155, IS 13095, with IP-55 actuator, capable of accepting upto 10V DC, and upto 20 mA electric signal and providing similar transduced feedback output to control system as per specification.		
25.26.2.1	600 mm dia	Each	173099.00
25.26.2.2	550 mm dia	Each	158343.00
25.26.2.3	500 mm dia	Each	140966.00
25.26.2.4	450 mm dia	Each	107007.00
25.26.2.5	400 mm dia	Each	97573.00
25.26.2.6	350 mm dia	Each	86320.00
25.26.2.7	300 mm dia	Each	75660.00
25.26.2.8	250 mm dia	Each	53188.00
25.26.2.9	200 mm dia	Each	40593.00
25.26.2.10	150mm dia	Each	30070.00

25.26.2.11	125mm dia	Each	28063.00
25.26.2.12	100mm dia	Each	27263.00
25.26.2.13	80mm dia	Each	12978.00
25.26.2.14	65mm dia	Each	12404.00
25.26.3	Supplying, fixing, testing and commissioning of following size NON - RETURN VALVE with duel plate of C I body SS plates vulcanized NBR seal flanged end & PN 16 pressure rating as specified		
25.26.3.1	400 mm dia	Each	42353.00
25.26.3.2	350 mm dia	Each	29912.00
25.26.3.3	300 mm dia	Each	16646.00
25.26.3.4	250 mm dia	Each	11025.00
25.26.3.5	200 mm dia	Each	6692.00
25.26.3.6	150mm dia.	Each	4202.00
25.26.3.7	125mm dia.	Each	3176.00
25.26.3.8	100mm dia	Each	2236.00
25.26.3.9	80mm dia.	Each	1579.00
25.26.3.10	65mm dia	Each	1301.00
25.27	Supply, installation, testing & commissioning of ceiling mounted double skin horizontal Hideaway type powder coated fan coil units complete with Minimum 3 row cooling coil ,copper connections sandwich extended drain pan (to cover two way valves, Y strainer & piping) with built in 2-Way Motroised valve, valve controller & Digital Thermostat, Ball valves set with strainer with Valve. FCU shall have forward curved fan driven by single phase motor suitable for 220 V $\pm$ 10% ,50Hz single phase power supply with 3 speed motor, filter plenum with prefilters hanging arrangement of rods and vibration isolators, 1 to 2 ft couple copper connections, 2 Meter Power cable with socket top,fire retardant flexible canvass connections & accessories as specified.FCU shall be suitable for high static. The capacities of Fan Coil units shall be as following.		
25.27.1	1.0 TR	Each	18600.00
25.27.2	1.5 TR	Each	19727.00
25.27.3	2.0 TR	Each	21629.00
25.27.4	2.5 TR (4 Row Coiling Coil)	Each	23508. 00
25.27.5	3.0 TR (4 Row Coiling Coil)	Each	28181. 00
25.27.6	3.5 TR (4 Row Coiling Coil)	Each	34287. 00
25.27.7	4.0 TR (4 Row Coiling Coil)	Each	37716. 00
25.28	Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/ round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as per specification.		
25.28.1	Thickness 0.63 mm sheet	Sqm	841.00

25.28.2	Thickness 0.80 mm sheet	Sqm	984.00
25.28.3	Thickness 1.00 mm sheet	Sqm	1085.00
25.28.4	Thickness 1.25 mm sheet	Sqm	1301.00
25.29	Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as per specification.		
25.29.1	Thickness 0.63 mm sheet	Sqm	825.00
25.29.2	Thickness 0.80 mm sheet	Sqm	958.00
25.29.3	Thickness 1.00 mm sheet	Sqm	1170.00
25.29.4	Thickness 1.25 mm sheet	Sqm	1271.00
25.30	Supply, installation, testing and commissioning of GI volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc, as per specifications.	Sqm	4285.00
25.31	Supply, installation, testing and commissioning of Motorized (ON-OFF Type) duct mounted GI volume control damper with enthalpy sensor and necessary control wire (minimum 1.5 Sqmm) for integration within AHU room.		
25.31.1	Damper	Sqm	4475.00
25.31.2	Actuator	Sqm	3897.00
25.32	Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.	Sqm	4826.00
25.33	Supplying & fixing of powder coated extruded aluminium Return Air Grills with louvers but without volume control dampers complete as per specification.	Sqm	3027.00
25.34	Supplying, fixing testing commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti smudge ring & removable core.	Sqm	6664.00
25.35	Supplying, fixing testing commissioning of Return air diffusers of powder coated aluminium without volume control dampers with anti smudge ring & removable core.	Sqm	4255.00
25.36	Supply, installation, testing & commissioning of thermal insulated flexible duct of following sizes duly supported at regular interval as per site requirement etc. complete as per specifications.		
25.36.1	200 mm dia.	Metre	275.00
25.37	Supplying, Fixing,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring,the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall		

also be closed in the event of fire signal complete as per specification.

25.37.1	Fire damper	Sqm	5577.00
25.37.2	Actuator	Sqm	5184.00
25.38	Supply and fixing of acoustic lining of supply air duct and plenum with 25 mm thick resin bonded glass wool having density of 32 kg/m ³ , with 25 mm X 25 mm GI section of 1.25 mm thick, at 600 mm centre to centre covered with Reinforced Plastic tissue paper and 0.5 mm thick perforated aluminum sheet fixed to inside surface of ducts with cadmium plated nuts, bolts, stick pins, CPRX compound etc. complete as per specification.	Sqm	364.00
25.39	Supplying, fixing acoustic lining on wall and ceiling of AHU rooms with 50mm thick, density 32 kg/cu.m resin bonded glass fiber insulation friction fixed in 610mm x 610 mm frame work made of 25 X 50 X50 X 50 X 25 mm made out of 0.6mm thick GI sheet U shaped channel and covered with reinforced fiber glass tissue and finished with 0.80 mm perforated aluminium sheet etc. complete as per specification.	Sqm	389.00
25.40	Supplying and fixing of following thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (class "O") insulation on existing duct after applying two coats of cold setting adhesive (CPR X compound). The joints shall sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specification.		
25.40.1	19mm	Sqm	558.00
25.40.2	25mm	Sqm	703.00
25.41	Supplying and fixing 50 mm thick aluminium foil faced resin bonded fibre glass insulation (on duct) of density 24 kg/cu.m after applying two coats of cold setting adhesive (CPRX compound) sealing all joints with self adhesive aluminium tape & covering with 0.63mmx19mm GI wire mesh netting butting all joints and laced with GI wire complete as per specification. (for indoor applications).	Sqm	222.00
25.42	Supplying and fixing 50mm thick aluminium foil faced resin bonded fibre glass insulation (on duct) of density 24 kg/cu.m after applying two coats of cold setting adhesive (CPRX compound) sealing all joints with self adhesive aluminium tape & covering with 0.63mmx19mm GI wire mesh netting & butting all joints and laced with GI wire complete and finally covered with one layer of tar felt stuck with hot bitumen as per specification. (for outdoor applications)	Sqm	271.00

25.43 Supply, Installation, Testing and commissioning of factory built floor mounted chilled water double skin type horizontal/vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation (having density 48 kg/cu m) factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as per specification, minimum 2 bend GSS/PVC eliminators, cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters, belt drive package with TEFC drive motor of efficiency class IE3 suitable for $415 \pm 10\%$ volts, 50Hz, 3 Phase AC supply suitably designed for variable frequency drive applications, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 nos.) and industrial type thermometers (2 nos.) at the inlet and outlet of coil, auto purge valve wherever required, including starter Panel of suitable capacity, necessary vibration isolation arrangement etc. complete as per specification and of following capacities.

25.43.1	2500CFM	Set	59668.00
25.43.2	3000CFM	Set	66688.00
25.43.3	4000CFM	Set	75176.00
25.43.4	5000CFM	Set	93788.00
25.43.5	6000CFM	Set	109671.00
25.43.6	7000CFM	Set	123252.00
25.43.7	8000CFM	Set	136832.00
25.43.8	9000CFM	Set	149745.00
25.43.9	10000CFM	Set	162659.00
25.43.10	11000CFM	Set	178664.00
25.43.11	12000CFM	Set	194669.00

25.44 Supply, Installation, Testing and commissioning of factory built floor mounted chilled water double skin type horizontal/vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation (having density 48 kg/cu m) factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as per specification, minimum 2 bend GSS/PVC eliminators, cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5mm) cooling coil of 4 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters, belt drive package with TEFC drive motor of efficiency class IE3 suitable for $415 \pm 10\%$ volts,

50Hz, 3 Phase AC supply suitably designed for variable frequency drive, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 nos.) and industrial type thermometers (2 nos.) at the inlet and outlet of coil, auto purge valve wherever required, including starter Panel of suitable capacity, necessary vibration isolation arrangement etc. complete as per specification and of following capacities.

25.44.1	2500CFM	Set	51290.00
25.44.2	3000CFM	Set	55765.00
25.44.3	4000CFM	Set	62223.00
25.44.4	5000CFM	Set	76994.00
25.44.5	6000CFM	Set	90134.00
25.44.6	7000CFM	Set	100832.00
25.44.7	8000CFM	Set	111531.00
25.44.8	9000CFM	Set	121555.00
25.44.9	10000CFM	Set	131579.00
25.44.10	11000CFM	Set	142642.00
25.44.11	12000CFM	Set	157468.00
25.45	Supply installation, testing & commissioning of modular type variable refrigerant flow/variable refrigerant volume air cooled outdoor units suitable for cooling and heating, having all hermetically sealed inverter type scroll compressor(s), minimum two compressors for above 14HP modules, microprocessor based controller, top discharge type condensing unit(s), with R410a refrigerant, vibration isolators, with suitable foundation etc. Complete as per specification. The unit shall deliver the rated capacity at AHRI conditions and work even at 50°C ambient temperature without tripping. The unit shall be suitable to work on 400v +/-10%, 3phase, 50Hz AC power supply. The unit shall be filled with first charge of the refrigerant and ready for use as per specification. The COP at AHRI conditions shall not be less than 3.1 and IEER not less than 6.5	Per HP	18521.00

INDOOR UNIT CASSETTE TYPE

25.46	Supply, installation, testing and commissioning of following minimum capacity 4-Way flow VRV/VRF Cassette Type Indoor ceiling mounted unit equipped with synthetic washable media pre-filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX Copper coil, electronic expansion valve, outer cabinet, drain pump, grill, necessary supports, vibration isolation, cordless remote control etc., suitable for operation on single phase 230V±10%, 50Hz AC supply, complete, as per specification. The unit shall have automatic force shut down provision in case of fire on receiving signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions		
-------	--	--	--

of 27 Degree C DB and 19Degree C WB temperature.

25.46.1	1.0-1.3 TR	Each	38491.00
25.46.2	1.5-1.8 TR	Each	41152.00
25.46.3	2.0-2.5 TR	Each	44860.00
25.46.4	2.6- 3.3 TR	Each	50934.00
25.46.5	3.5-4.0 TR	Each	52572.00

INDOOR UNIT HIWALL TYPE

- 25.47 Supply, installation, testing and commissioning of following minimum capacity VRV/VRF High wall Type Indoor unit equipped with synthetic washable media pre-filter, fansection with low noise fan/dynamically balanced blower, multispeed motor, coilsection with DX Copper coil, electronic expansion valve, outer cabinet, vibration isolators, cordless remote control, drain pan, necessary accessories/Supports etc., suitable for operation on 230V±10%, 50Hz single phase AC supply, complete, as per specification. The unit shall have automatic force shut down provision in case of fire on receiving signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19Degree C WB temperature.

25.47.1	1.0-1.25 TR	Each	25023.00
25.47.2	1.3-1.7 TR	Each	26147.00
25.47.3	1.8-2.2 TR	Each	28986.00

INDOOR UNIT DUCTABLE TYPE

- 25.48 Supply, installation, testing and commissioning of following minimum capacity and external Static pressure VRV/VRF Ceiling Mounted Ductable Type Indoor unit equipped with synthetic washable media pre-filter, fansection with low noise fan/dynamically balanced blower, multispeed motor, coilsection with DX Copper coil, electronic expansion valve, outer cabinet, vibration isolators, cordless remote control, drain pan, other necessary accessories/Supports etc., suitable for operation on 230V±10%, 50Hz single phase AC supply, complete, as per specification. The unit shall have automatic force shut down provision in case of fire on receiving signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19 Degree C WB temperature.

Low Static Ductable Unit {Minimum 25 Pascal external static Pressure }

25.48.1	0.8 TR	Each	32303.00
25.48.2	1.2 TR	Each	37762.00
25.48.3	1.6 TR	Each	38400.00

Mid Static Ductable Unit {Minimum 45 Pascal external static Pressure }

25.48.4	2 TR	Each	41402.00
25.48.5	2.3 TR	Each	43859.00

25.48.6	3.2 TR	Each	53686.00
25.48.7	4 TR	Each	59510.00
High Static Ductable Unit {Minimum 110 Pascal external static Pressure }			
25.48.8	6.5 TR	Each	91130.00
25.48.9	8 TR	Each	96454.00
25.49	Supply, installation, testing and commissioning of following minimum capacity and external Static pressure Non VRV/VRF Ceiling Mounted/split type Ductable IDU & ODU equipped with synthetic washable media pre-filter, fan section with low noise fan/dynamically balanced blower, multispeed motor, coil section with DX Copper coil, electronic expansion valve, outer cabinet, vibration isolators, cordless remote control, drain pan, other necessary accessories/Supports, fittings etc., suitable for operation on 230V±10%, 50Hz single phase AC supply, complete, as per specification. The unit shall have automatic force shut down provision in case of fire on receiving signal from BMS System. The cooling capacity of indoor unit will be at air inlet conditions of 27 Degree C DB and 19 Degree C WB temperature.		
25.49.1	Ductable Unit 5.5 TR (Non VRV)	Each	56800.00
25.49.2	Ductable Unit 8.5 TR (Non VRV)	Each	78909.00
25.49.3	Ductable Unit 11 TR (Non VRV)	Each	113600.00
25.49.4	Ductable Unit 16.5 TR (Non VRV)	Each	157818.00
25.50	Supply, installation, testing and commissioning of AHU Kit		
25.50.1	8.25 TR	Each	31939.00
25.50.2	16.5 TR	Each	32575.00
25.51	Supply, Installation, testing and commissioning including vaccumiazation and Nitrogen testing of following nominal sizes of soft/hard drawn copper refrigerant piping for VRV/VRF system, complete with fittings, with suitable adjustable ring type hanger supports, jointing/brazing including accessories, insulated with XPLE Class-O tubular insulation/with Class-O closed cell elastometric nitrile rubber tubular sleeves sections of specified thickness as given below for Suction and Liquid lines, all accessories as per specifications etc. as per specification :		
25.51.1	6.4 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	228.00
25.51.2	9.5 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	269.00
25.51.3	12.7 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	349.00

25.51.4	15.9 mm dia (OD) (Soft drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	687.00
25.51.5	19.1 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	784.00
25.51.6	22.2 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	925.00
25.51.7	25.4 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	969.00
25.51.8	28.6 mm dia (OD) (Hard drawn) with tube thickness 1.2 mm with 19 mm thick insulation	Rmt.	1019.00
25.51.9	31.8 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	Rmt.	1085.00
25.51.10	34.9 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	Rmt.	1151.00
25.51.11	38.1 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	Rmt.	1238.00
25.51.12	41.3 mm dia (OD) (Hard drawn) with tube thickness 1.62 mm with 19 mm thick insulation	Rmt.	1321.00
	Note:-		4732.00
	1) The Copper Piping & Piping Circuit should be with Minimum Number of joints, which shall be attained by :		
	(i) Using One End Expanded Tubes		
	(ii) Bending the tubes instead of using elbow joints wherever 90 degree bending is required.		
	(2) Piping should be routed at site in such a manner, that brazed joints in the refrigeration piping are kept to a minimum.		
	(3) The makes of tube fittings shall be same as that of tubes.		
	(4) The thickness of fittings used shall be same as that of the pipe.		
25.52	Supplying and installation of Refnet Joints as per site conditions.	Each	4732.00
25.53	All Control/communication wiring between indoor and Outdoor Units with FRLS PVC conduit and necessary clamps/saddling etc. complete as Required.	Rmt.	173.00
25.54	400 mm Wide G.I. Tray Covered with G.I. Sheet for Copper Tubes.	Rmt.	501.00
25.55	Supplying, laying, fixing and installation of rigid PVC drain piping of 6 KG/sqcm, duly insulated with 6/9 mm thick nitrile rubber pipe section, complete with all necessary fitting such as elbows, tees, reducers, serviceable "P" traps etc. and supports such as clamps etc. complete as per specifications.		
25.55.1	25 MM DIA	Rmt.	128.00
25.55.2	32 MM DIA	Rmt.	150.00

25.55.3	40 MM DIA	Rmt.	173.00
25.55.4	50 MM DIA	Rmt.	182.00
25.56	Supplying and fixing 25 mm thick resin bonded fibre glass Acoustic insulation (on duct) of density 24 kg/cu.m or mineral wool insulation(non combustible) of density 44 kg/cu m after applying two coats of cold setting adhesive (CPRX compound) sealing all joints with self adhesive aluminium tape & covering with 0.63mmx19mm GI wire mesh netting butting all joints and laced with GI wire complete and as per specification. (for indoor/outdoor applications).	Sqm.	607.00
25.57	Supplying and fixing of Acoustic insulation with 6 mm thick resin bonded fiber glass Rigid Board density not less than 48KG/cu.mtr density coverd with R.P. tissue paper and 24G Perforated aluminium sheet having 3mm perforations at 6mm centers.	Sqm.	410.00
25.58	Supplying and fixing of 25mm thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (Class "O") insulation on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specification.	Sqm.	685.00
25.59	Underdeck insulation for exposed slab with 50 mm thick "TF" Quality Expanded polystyrene with washers, G.I. Crossed binding wires, Joints sealed with bitumen etc. complete as per specification.	Sqm.	501.00
25.60	Supplying and fixing of 19mm thickness closed cell Nitrile rubber (Class "O") insulation for Supply air duct on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specification.	Sqm.	529.00
25.61	Supplying and fixing of 13mm thickness closed cell Nitrile rubber (Class "O") insulation for Return air duct on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specification.	Sqm.	490.00
25.62	Supplying and fixing of 25mm thickness closed cell Nitrile rubber (Class "O") insulation for Exposed duct on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation complete as per specification.	Sqm.	783.00
25.63	Supply and fixing of Powder Coated extruded Aluminium Return Air Grilles with louvers but without volume control dampers	Sqm.	5140.00

complete as per specification.

25.64	Supply, fixing, testing and commissioning of Supply Air Diffuser of Powder Coated Aluminium with Aluminium volume control dampers with antismudge ring and removable core.	Sqm.	7833.00
25.65	Supply, fixing, testing and commissioning of Return Air Diffuser of Powder Coated Aluminium without volume control dampers with antismudge ring and removable core.	Sqm.	7116.00
25.66	Supplying, fixing, testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring, the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as per specification		
25.66.1	Fire damper	Sqm.	7407.00
25.66.2	Actuator and control pannel	Each	12329.00
25.67	Supply, installation, testing and commissioning of GI Volume Control Collar/ duct Dampers Complete with neoprene rubber gaskets. Nuts Bolts, screw linkages, flanges etc., as per Specifications	Sqm.	4406.00
25.68	Supply & fixing Of MS stand for outdoor units	Each	2730.00
25.69	Supply & fixing Of Branch Kit Joints.	Each	3822.00
25.70	SITC Of VRV System including topping R-410 gas as per site requirements. Refrigerant shall be environment Friendly R-410	Per Kg	1018.00
25.71	Supply, Installation, Testing & Commissionig of flexible {canvas} connection between duct and Machine	Each	2207.00
25.72	Supply, Installation, Testing & Commossionig of Control Cum Transmission Wiring in suitable conduits between indoor & outdoor units &for remote including supply of screendwires, Supports, installation, saddles, ties, tags, ferrules, lungs, nuts/bolts/hardware etc.complete in all aspects as per specifications & any other items required to make the system complete.		
25.72.1	2C X 1.0 Sq mm Copper	Metre	156.00
25.73	Supply, Installation, Testing and commissioning of factory built floor/ceiling mounted DX type double skin type horizontal/vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8 mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation (having density 48 kg/cu m) factory injected between them by injection		

moulding machine, complete with blower section with blower suitable for static pressure as per specification, minimum 4 bend GSS/PVC eliminators, DX type cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5 mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters, belt drive package with TEFC drive motor of efficiency class IE3 suitable for $415 \pm 10\%$ volts, 50Hz, 3 Phase AC supply suitably designed for variable frequency drive applications, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 nos.) and industrial type thermometers (2 nos.) at the inlet and outlet of coil, auto purge valve wherever required, including starter Panel of suitable capacity, necessary vibration isolation arrangement, without mixing Box etc. complete as per specification and of following capacities.

25.73.1	5000 CFM	Set	92814.00
25.73.2	6000 CFM	Set	103733.00
25.73.3	7000 CFM	Set	125571.00
25.73.4	10000 CFM	Set	147410.00
25.73.5	20000 CFM	Set	295729.00
25.74	Supply, Installation, Testing and commissioning of factory built floor/ceiling mounted DX type double skin type horizontal/vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation (having density 48 kg/cu m) factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as per specification, minimum 4 bend GSS/PVC eliminators, DX type cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters, belt drive package with TEFC drive motor of efficiency class IE3 suitable for $415 \pm 10\%$ volts, 50Hz, 3 Phase AC supply suitably designed for variable frequency drive applications, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 nos.) and industrial type thermometers (2 nos.) at the inlet and outlet of coil, auto purge valve wherever required, including starter Panel of suitable capacity, necessary vibration isolation arrangement, with mixing Box etc. complete as per specification and of following		

	capacities.		
25.74.1	5000 CFM	Set	112832.00
25.74.2	6000 CFM	Set	124662.00
25.74.3	7000 CFM	Set	149229.00
25.74.4	10000 CFM	Set	180168.00
25.74.5	20000 CFM	Set	356696.00
25.75	Supplying , installation , testing and commissioning of AHRI certified water cooled multi screw chiller of following capacity complete with semi-hermatic/open type multi compressor motor, flooded type chiller, drive sets, mounting frame, control panel with automatic controls, inter connecting refrigerant piping complete as per specifications and drawings, refrigerant-134a and oil vibration isolator, insulation of chiller and suction pipe, etc. BMS interface unit (pressure/microgateway/ datalink/backnet /modbus) if required. The motor shall be suitable for operation on $415 \pm 10\%$ Volt, 50Hz, 3 phase AC power supply. Chilling machine shall be strictly with free standing/unit mounted VFD starter and with active harmonic filter. The water chilling machine shall be as per following specifications. Chilled water leaving temperature: 6.7°C Chilled water entering temperature: 12.2°C Chiller fouling factor: 0.0005 FPS Chilled water flow rate: 2.4 USGPM/TR Condensor water leaving temperature: 36.4°C Condensor water entering temperature: 32.2°C Condensor fouling factor : 0.001 FPS Condensor water flow rate: 4 USGPM/TR Refrigerant: R-134a IKW/TR: 0.68 And other technical parameters to be calculated as per site requirements.	Per TR	19676.00
25.76	Supplying , installation , testing and commissioning of AHRI certified water cooled multi scroll chiller of following capacity complete with hermatically sealed scroll type multi compressor motor, DX type chiller, drive sets, mounting frame, control panel with automatic controls, inter connecting refrigerant piping complete as per specifications and drawings, refrigerant R-407c and oil vibration isolator, insulation of chiller and suction pipe, including starter Pannel of suitable capacity etc. BMS interface unit (pressure/microgateway/datalink/backnet /modbus) if required. The motor shall be suitable for operation on $415 \pm 10\%$	Per TR	18114.00

Volt, 50Hz, 3 phase AC power supply. Chilling machine shall be strictly with free standing/unit mounted VFD starter and with active harmonic filter.

The water chilling machine shall be as per following specifications.

Chilled water leaving temperature: 6.7°C

Chilled water entering temperature: 12.2°C

Chiller fouling factor: 0.0005 FPS

Chilled water flow rate: 2.4 USGPM/TR

Condensor water leaving temperature: 36.4°C

Condensor water entering temperature: 32.2°C

Condensor fouling factor : 0.001 FPS

Condensor water flow rate: 4 USGPM/TR

Refrigerant: R-407c

IKW/TR: 0.68

And other technical parameters to be calculated as per site requirements.

- 25.77 Supply, installation, testing and commissioning of FRP induced draught type cooling towers complete with FRP basin having an auxiliary rectangular suction tank at the bottom. The basin shall be complete with connections for drain, overflow, makeup water, quick fill and float valve, plus hot dipped galvanised suction strainer FRP body, of sufficient strength to with stand wind velocities upto 60 m/s, vibrations and earth quakes, fan and motor assembly conforming to IP-55, protection for outdoor operation fill media of honeycomb design arranged in the suitable pattern for ease of replacement, distribution pipes consisting of PVC sprinkler pipes mounted on top of the main supply standby, sprinkler head mounted on ball bearings designed to take both radial and vertical thrust overflow pipe, ladder, vibration isolation pads, cables, controls etc. as per specifications and drawing.

25.77.1	80 TR Nominal capacity	Each	154711.00
25.77.2	100 TR Nominal capacity	Each	198067.00
25.77.3	150 TR Nominal capacity	Each	241423.00
25.77.4	200 TR Nominal capacity	Each	308458.00
25.77.5	250 TR Nominal capacity	Each	363686.00
25.77.6	300 TR Nominal capacity	Each	425508.00
25.77.7	400 TR Nominal capacity	Each	547740.00

CHAPTER 26 - FIRE ALARM SYSTEM

All works shall be carried out as per IS: 2189 (2008) and NFPA 72 (2019) item of work, CPWD specifications for Fire Alarm Works using material as specified by the manufacturers of that item, as per relevant BIS specifications and as per additional specifications attached with tender documents:

(A) **MEASUREMENT:**

All items shall be measured in by counting in numbers.

(B) **RATE:** The rate of items includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
26.1	Supplying , installation , testing and commissioning of Fire alarm Control panel (UL Listed) suitable for 50 addressable points (Detector & Devices). Comprising of the following system components: Operating units, Periphery boards, Power supplies, System enclosures, with battery backup 24hours and 30minutes,	Each	81508.00
26.2	Supplying , installation , testing and commissioning of Fire alarm Control panel (UL Listed) suitable for 252 addressable points (Detector & Devices). Comprising of the following system components: Operating units, Periphery boards, Power supplies, System enclosures, with battery backup 24hours and 30minutes,	Each	106879.00
26.3	Supplying , installation , testing and commissioning of Fire alarm Control panel (UL Listed) suitable for 504 addressable points (Detector & Devices). Comprising of the following system components: Operating units, Periphery boards, Power supplies, System enclosures, with battery backup 24hours and 30minutes, 32-character custom messages ,	Each	191450.00
26.4	Supplying , installation , testing and commissioning of 5 Loop Fire alarm Control panel (UL Listed) (Expandable Type), Each loop having capacity to handle 252 addressable points (detector & devices) in any flexible combination, with battery backup 24hours and 30minutes, 6", backlit LCD display, Touch screen for maintenance operations and function keys, Multi-language display, 5000-event, history-logging capability with on-line and off-line reports , Multiple levels of password protection, Time-based-controlled output functions, Holiday schedule, UL 864 9th Edition Listed & ULC Listed FM Approved.	Each	352135.00
26.5	Supplying , installation , testing and commissioning of 10 Loop Fire alarm Control panel (Modular) each loop 252 points Each loop having capacity to handle 252 addressable points (detector & devices) in any flexible combination, with battery backup 24hours and 30minutes, 6", backlit LCD display, Touch screen for maintenance operations and function keys, Multi-language display, 5000-event, history-logging capability with on-line and off-	Each	550876.00

Code No.	Description	Unit	Rate Rs.
	line reports ,Multiple levels of password protection,Time-based-controlled output functions,Holiday schedule,UL 864 9th Edition Listed & ULC Listed FM Approved.		
26.6	Supplying , installation , testing and commissioning of Additional Loop Card	Each	22891.00
26.7	Supplying , installation , testing and commissioning of Remote Printer Module Optional	Each	40389.00
26.8	Supplying , installation , testing and commissioning of Panel to Panel network card	Each	25326.00
26.9	Supplying , installation , testing and commissioning of Intelligent Addressable Multi-sensor Smoke detector:Multi-criteria addressable fire detector that incorporates photoelectric and thermal sensors,Polarity insensitive utilizing SureWire™ technology,Tri-color detector status LED with 360° viewing,Field-selectable application profiles,Superior EMI immunity, Remote sensitivity-measurement capability,Automatic environment compensation,UL Listed and ULC Listed; FM Approved.	Each	2538.00
26.10	Supplying , installation , testing and commissioning of Intelligent Addressable Heat detector:Provides seven (7) field-selectable settings in the 135° í 174°F (57.2° í 78.9°C) temperature range ,Tri-color detector-status light-emitting diode (LED) with 360° viewing,Polarity insensitive utilizing SureWire™ technology,Superior EMI / RFI Immunity,UL521 Listed and ULC Listed; FM Approved.	Each	2369.00
26.11	Supplying , installation , testing and commissioning of Intelligent Addressable Type Manual Call Point:Intelligent Manual Fire Alarm Box is constructed of durable, molded and polycarbonate material that is matte finished in red with raised white lettering Single-action,Pull-down lever is down, until manually reset,Polarity insensitive via SureWire™ technology	Each	3669.00
26.12	Supplying , installation , testing and commissioning of Short circuit Isolator Base:Local light-emitting diode (LED) indicator UL 864 9th Edition Listed and ULC Listed; FM Approved	Each	1827.00
26.13	Supplying , installation , testing and commissioning of Conventional Type Hooter with Strobe:Hooter with Strobe. Wall Mount models feature field selectable candela settings of 15/30/75/110cd and 135/185cd. Ceiling Mount models feature field selectable candela settings of 15/30/75/95cd and 115/177cd. UL Listed, ULC, FM approved. NFPA Compliant. Red.	Each	4321.00
26.14	Supplying , installation , testing and commissioning of Response Indicator for above false ceiling detector	Each	133.00
26.15	Supplying , installation , testing and commissioning of Intelligent Addressable Relay control module for Hooter Interfacing and supervising normally open (N.O) or normally closed (N.C) contacts,Integral single-pole, double-throw (SPDT) relay (up to 4 amps) ,Multi-color light-emitting diode	Each	3635.00

Code No.	Description	Unit	Rate Rs.
	(LED) indicates system status, UL Listed & ULC Listed; FM Approved		
26.16	Supplying , installation , testing and commissioning of 2 core x 1.5 sq.mm Armoured FRLS Fire cable	Metre	433.00
26.17	Supply and erecting of following ISI marked Fire extenguishers on wall/ column including erecting bracket etc complete.		
26.17.1	ABC Fire Extinguisher 9KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 6A, 144B. With all accessories.	Each	4648.00
26.17.2	ABC Fire Extinguisher 6KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 4A, 144B. With all accessories.	Each	3868.00
26.17.3	ABC Fire Extinguisher 4KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 2A, 89B. With all accessories.	Each	3477.00
26.17.4	ABC Fire Extinguisher 2KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 1A, 34B. With all accessories.	Each	2177.00
26.17.5	CO2 type Fire Extinguisher ISI marked confirming to IS:15683:2018 Capacity 4.5Kg. INITIAL CHARGE:- Carbon dioxide used in extinguishers shall comply with IS 15222. FIRE RATING:- 55B. Complete with Hose Assembly and horn , locking arrangement, operation manual, bracket with two screw and sleeve	Each	6989.00
26.17.6	CO2 type Fire Extinguisher ISI marked confirming to IS:15683:2018 Capacity 3Kg. INITIAL CHARGE:- Carbon dioxide used in extinguishers shall comply with IS 15222. FIRE RATING:- 34B. Complete with Hose Assembly and horn, locking arrangement, operation manual, bracket with two screw and sleeve	Each	5428.00
26.17.7	CO2 type Fire Extinguisher ISI marked confirming to IS: 15683:2018 Capacity 2 Kg. INITIAL CHARGE:- Carbon dioxide used in extinguishers shall comply with IS 15222. FIRE RATING:- 21B. Complete with Hose Assembly and horn , locking arrangement, operation manual, bracket with two screw and sleeve	Each	4648.00
26.18	Dismantaling, re-filling and erecting of following ISI markzed Fire extenguishers on wall/ column including etc complete.		
26.18.1	ABC Fire Extinguisher 9KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 6A, 144B. With all accessories.	Each	1526.00
26.18.2	ABC Fire Extinguisher 6KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 4A, 144B. With all accessories.	Each	1092.00

Code No.	Description	Unit	Rate Rs.
26.18.3	ABC Fire Extinguisher 4KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 2A, 89B. With all accessories.	Each	803.00
26.18.4	ABC Fire Extinguisher 2KG Nitrogen Store Pressure As per IS: 15683:2018 Body Sheet Not Less Than 2mm Thickness, CE Mark NRV Valve With ABC Powder 90% UL 299 FIRE RATING: 1A, 34B. With all accessories.	Each	514.00
26.18.5	CO ₂ type Fire Extinguisher ISI marked confirming to IS:15683:2018 Capacity 4.5Kg. INITIAL CHARGE:- Carbon dioxide used in extinguishers shall comply with IS 15222. FIRE RATING:- 55B. Complete with Hose Assembly and horn , locking arrangement, operation manual, bracket with two screw and sleeve	Each	745.00
26.18.6	CO ₂ type Fire Extinguisher ISI marked confirming to IS:15683:2018 Capacity 3Kg. INITIAL CHARGE:- Carbon dioxide used in extinguishers shall comply with IS 15222. FIRE RATING:- 34B. Complete with Hose Assembly and horn , locking arrangement, operation manual, bracket with two screw and sleeve	Each	615.00
26.18.7	CO ₂ type Fire Extinguisher ISI marked confirming to IS: 15683:2018 Capacity 2 Kg. INITIAL CHARGE:- Carbon dioxide used in extinguishers shall comply with IS 15222. FIRE RATING:- 21B. Complete with Hose Assembly and horn , locking arrangement, operation manual, bracket with two screw and sleeve	Each	485.00
26.19	Supplying , installation , testing and commissioning of electrical motor driven main pump of horizontal centrifugal end suction backpull out type of cast iron body, bronze impeller, SS 410 shaft with mechanical seal and capable to deliver 1620 LPM at 70 MWC.The pump shall be coupled to TEFC motor of suitable 50 HP with speed of 2875 RPM and complete set shall mounted on common base frame. The quoted rate shall includes providing & fixing of coupling, coupling gaurd, RCC foundation(as recommended by manufacturer) and Foundation bolts etc.	Each	157225.00
26.20	Supplying , installation , testing and commissioning of electrical motor driven Jockey pump of horizontal centrifugal end suction closed coupled type of cast iron body, bronze impeller, SS 410 shaft with mechanical seal gland packing and capable to deliver 180LPM at 70 MWC.The pump shall be coupled to TEFC motor of suitableHPwith speed of 2900RPM and complete set shall mounted on common base frame. The quoted rate shall includes providing & fixing of coupling, coupling gaurd, RCC foundation(as recommended by manufacturer) and Foundation bolts etc.	Each	33684.00

Code No.	Description	Unit	Rate Rs.
26.21	Supplying , installation , testing and commissioning of diesel Engine driven common stand by pump, horizontal centrifugal end suction backpull out type of cast iron body, bronze impeller, SS 410 shaft with mechanical seal and capable to deliver 1620 LPM at 70 MWC. The pump shall coupled to suitable 67 HP of Diesel engine radiator water cooled type with speed of 2150 RPM and complete set shall be mounted on common base frame. 12 vBatteries & battery leads with stand, Fuel tank (for 6 Hrs. operation) with stand & gauge glass, Fuel piping with valves. The quoted rate shall includes radiator water cooling piping(if required) coupling gaurd and other stanadrd accessories,RCC foundation (as recommended by manufacturer) and foundation bolts, etc. complete.	Each	402869.00
26.22	Supplying , installation , testing and commissioning of electrical motor driven main pump of horizontal centrifugal end suction backpull out type of cast iron body, bronze impeller, SS 410 shaft with mechanical seal and capable to deliver 2280 LPM at 70 MWC.The pump shall be coupled to TEFC motor of suitable 60 HP with speed of 2875 RPM and complete set shall mounted on common base frame. The quoted rate shall includes providing & fixing of coupling, coupling gaurd, RCC foundation(as recommended by manufacturer) and Foundation bolts etc.	Each	189423.00
26.23	Supplying , installation , testing and commissioning of diesel Engine driven common stand by pump, horizontal centrifugal end suction backpull out type of cast iron body, bronze impeller, SS 410 shaft with mechanical seal and capable to deliver 2280 LPM at 70 MWC. The pump shall coupled to suitable 67 HP of Diesel engine radiator water cooled type with speed of 2150 RPM and complete set shall be mounted on common base frame. 12 vBatteries & battery leads with stand, Fuel tank (for 6 Hrs. operation) with stand & gauge glass, Fuel piping with valves. The quoted rate shall includes radiator water cooling piping(if required) coupling gaurd and other stanadrd accessories,RCC foundation (as recommended by manufacturer) and foundation bolts, etc. complete.	Each	33684.00
26.24	Supplying , installation , testing and commissioning of diesel Engine driven common stand by pump, horizontal centrifugal end suction backpull out type of cast iron body, bronze impeller, SS 410 shaft with mechanical seal and capable to deliver 2280 LPM at 70 MWC. The pump shall coupled to suitable 67 HP of Diesel engine radiator water cooled type with speed of 2150 RPM and complete set shall be mounted on common base frame. 12 vBatteries & battery leads with stand, Fuel tank (for 6 Hrs. operation) with stand & gauge glass, Fuel piping with valves. The quoted rate shall includes radiator water cooling piping(if required) coupling gaurd and other stanadrd accessories,RCC foundation (as recommended by manufacturer) and foundation bolts, etc. complete.	Each	409238.00

CHAPTER 27 – CCTV SYSTEM & EPABX

All works shall be carried out as per item of work, CCTV Works using material as specified by the manufacturers of that item, as per relevant BIS specifications and as per additional specifications attached with tender documents:

(A) **MEASUREMENT:**

All items shall be measured in by counting in numbers.

(B) **RATE:** The rate of items includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
27.1	Supplying , installation , testing and commissioning of ANALOGUE TYPE BULLET AHD 2MP CAMERA of 1080P real time high resolution, CMOS progressive scan, True day/night capability• Minimum illumination: 0 Lux (IR ON), TDN (IR-cut), AWB, AGC, Defog, 3.6mm & 2.8-12mm lens, IR distance: upto 40 meters, Power: 12VDC, Vandal resistant, Dual output AHD & CVBS as per specifications.	Each	2778.00
27.2	Supplying , installation , testing and commissioning of ANALOGUE TYPE DOME AHD 2MP CAMERA of 1080P real time high resolution, CMOS progressive scan, True day/night capability• Minimum illumination: 0 Lux (IR ON), TDN (IR-cut), AWB, AGC, Defog, 3.6mm & 2.8-12mm lens, IR distance: upto 40 meters, Power: 12VDC, Vandal resistant, Dual output AHD & CVBS as per specifications.	Each	2724.00
27.3	Supplying , installation , testing and commissioning of ANALOGUE TYPE BULLET AHD 2MP CAMERA VF of 1080P real time high resolution, CMOS progressive scan, True day/night capability• Minimum illumination: 0 Lux (IR ON), TDN (IR-cut), AWB, AGC, Defog, 3.6mm & 2.8-12mm lens, IR distance: upto 40 meters, Power: 12VDC, Vandal resistant, Dual output AHD & CVBS as per specifications.	Each	4865.00
27.4	Supplying , installation , testing and commissioning of ANALOGUE TYPE DOME AHD 2MP CAMERA VF of 1080P real time high resolution, CMOS progressive scan, True day/night capability• Minimum illumination: 0 Lux (IR ON), TDN (IR-cut), AWB, AGC, Defog, 3.6mm & 2.8-12mm lens, IR distance: upto 40 meters, Power: 12VDC, Vandal resistant, Dual output AHD & CVBS as per specifications.	Each	4598.00
27.5	Supplying , installation , testing and commissioning of ANALOGUE TYPE 18 x 2MP IR HD PTZ CAMERA 1/2.9" 18x SONY 2 MP CMOS Sensor, H.264 compression supported, 4.7mm-84.6mm Varifocal Lens for 18x, IR Distance of max 120m, IP66 outdoor as per specifications.	Each	36980.00
27.6	Supplying , installation , testing and commissioning of ANALOGUE TYPE 33 x 2MP IR HD PTZ CAMERA 1/2.9" for 18x and 1/2.8" for 33x - SONY 2 MP CMOS Sensor, H.264, compression supported, 4.6mm-152mm Varifocal Lens for 33x, IR Distance max 60m, IP66 outdoor as per specifications.	Each	54108.00
27.7	Supplying , installation , testing and commissioning of 04 CHANNEL AHD 1080P DVR high resolution recording, H.264 High profile compression, Playback 4/8/16 channels simultaneously, Multiple recording options: manual, schedule, motion detection, Pentaplex operation: live view, record, play back, backup and remotely access, HDMI and VGA output simultaneously upto 1080P resolution, 1 SATA HDD, DHCP, DDNS, IE browser and CMS supported, Mobile app for Android and Ios, Power: DC12V as per the specifications.	Each	5668.00
27.8	Supplying , installation , testing and commissioning of 08 CHANNEL AHD 1080P DVR high resolution recording, H.264 High profile compression, Playback 4/8/16 channels simultaneously, Multiple recording options: manual, schedule, motion detection, Pentaplex operation: live view, record, play back, backup and remotely access, HDMI and VGA output simultaneously upto 1080P resolution, 1 SATA HDD, DHCP, DDNS, IE browser and CMS supported, Mobile app for Android and Ios, Power:	Each	9682.00

Code No.	Description	Unit	Rate Rs.
27.9	DC12V as per the specifications. Supplying , installation , testing and commissioning of 16 CHANNEL AHD 1080P DVR high resolution recording, H.264 High profile compression, Playback 4/8/16 channels simultaneously, Multiple recording options: manual, schedule, motion detection, Pentaplex operation: live view, record, play back, backup and remotely access, HDMI and VGA output simultaneously upto 1080P resolution, 1 SATA HDD, DHCP, DDNS, IE browser and CMS supported, Mobile app for Android and Ios, Power: DC12V as per the specifications.	Each	18246.00
27.10	Supplying , installation , testing and commissioning of 2 MP Bullet Camera weather & dust proof IP based Fixed Lens day/night Camera (IP67 , IK 10) , 2 MP CMOS Image Sensor ,H.265 and H.264 triple-stream WDR(120dB), Day/Night, UL ,CE FCC Certified as per the specifications.	Each	4330.00
27.11	Supplying , installation , testing and commissioning of 4 MP Bullet Camera weather & dust proof IP based Fixed Lens day/night Camera (IP67 , IK 10) , 1/3" 4MP PS CMOS Image Sensor, H.265 and H.264 triple-stream encoding, WDR(120dB), Day/Night Support, UL ,CE FCC Certified as per the specifications.	Each	5400.00
27.12	Supplying , installation , testing and commissioning of 2 MP DOME Camera weather & dust proof IP based Fixed Lens day/night Camera (IP66) 2Megapixel CMOS Image Sensor,H.265 / H.264 triple-stream encoding , WDR(120dB), Day/Night UL, CE, FCC Certified as per the specifications.	Each	4330.00
27.13	Supplying , installation , testing and commissioning of 2 MP ANPR Camera Image sensor 1/1.9 CMOS , 2 MP 1920x1080 Lens 10.5~42mm , H.264/H.265/MJPEG , Frame Rate 50/60 FPS, WDR100dB, ANR,AWB, AE, Auto IRIS, Alarm in/ out , Traffic Counting Range 15~80 Mtr , 1RS232 serial Port , 2 RS485 port , 1 GPS, IR Range of 100 MTR , SD Card 128GB „Number Plate snap, Support Traffic Flow , occupancy , heady , average speed , queue, length atatic embedded Integration component design , built in variety algorithm such as ANPR , traffic Data collection and analysis, vehicle type Classification , Traffic incidents detection , vehicle brand . 1 Ethernet Port (100/1000m) , Built in sunshade unit , IP66, AC220V , Mounting accessories as per the specifications.	Each	64814.00
27.14	Supplying , installation , testing and commissioning of 2 MP PTZ Camera weather & dust proof IP based Dome PTZ (Pan Tilt & Zoom) true day& night camera ,1/2.8" 2MP PS CMOS Image sensor, Max. 25/30fps@1080P,Color: 0.005Lux@F1.6; 0Lux@F1.6 (IR on), Powerful 25x Optical and 16x Digital zoom, WDR(120dB), 3D DNR, Day/Night(ICR),Defog, ROI, , BLC, HLC, Support Starlight Function, Up to 300 presets, auto scan, 8 tour, 5 pattern, auto pan, IR Range of 100 Mtr. , Max 300° /s pan speed, 360° endless pan rotation, Support PoE+, UL, CE ,FCC certified as per specifications.	Each	35374.00
27.15	Supplying , installation , testing and commissioning of 2 MP PTZ Camera weather & dust proof IP based Dome PTZ (Pan Tilt & Zoom) true day& night camera ,1/2.8" 2MP PS CMOS Image sensor, Max. 50/60fps@1080P,Color: 0.005Lux@F1.6; 0Lux@F1.6 (IR on), Powerful 25x (4.8~120mm) Optical and 16x Digital zoom, WDR(120dB), 3D DNR, Day/Night(ICR),Defog, ROI, EIS, AGC, BLC, HLC, Support Starlight Function, Up to 300 presets, auto scan, 8 tour, 5 pattern, auto pan,Tripwire, Intrusion,Abandoned/Missing, Face Detection, Heat Map, IR Range of 200 Mtr. , Max 300° /s pan speed, 360° endless pan rotation, Memory Card Upto 128GB, Built-in 7/2 alarm in/out, IP67, IK10 , Support PoE+, UL, CE ,FCC certified as per the specifications.	Each	43404.00
27.16	Supplying , installation , testing and commissioning of 2 MP PTZ Camera weather & dust proof IP based Dome PTZ (Pan Tilt & Zoom) true day& night camera ,1/2.8" 2MP PS CMOS Image sensor, Max. 50/60fps@1080P,Color: 0.005Lux@F1.6; 0Lux@F1.6 (IR on), Powerful 30x (4.5~135 mm) Optical and 16x Digital zoom, WDR(120dB), 3D DNR, Day/Night(ICR),Defog, ROI, EIS, AGC, BLC, HLC, Support Starlight	Each	51433.00

Code No.	Description	Unit	Rate Rs.
27.17	Function, Up to 300 presets, auto scan, 8 tour, 5 pattern, auto pan, Tripwire, Intrusion, Abandoned/Missing , Face Detection, Heat Map, IR Range of 200 Mtr. , Max 300° /s pan speed, 360° endless pan rotation, Built-in 7/2 alarm in/out, Micro SD card 256GB, IP67, IK10 , Support PoE+, UL, CE ,FCC certified as per the specifications. Supplying , installation , testing and commissioning of 2 MP PTZ Camera of weather & dust proof IP based Dome PTZ (Pan Tilt & Zoom) true day& night camera ,1/2.8" 2MP PS CMOS Image sensor, Max. 50/60fps@1080P, Color: 0.005Lux@F1.6; 0Lux@F1.6 (IR on), Powerful 45x (3.95~177.7 mm) Optical and 16x Digital zoom, WDR(120dB), 3D DNR, Day/Night(ICR), Defog, ROI, EIS, AGC, BLC, HLC, Support Starlight Function, Up to 300 presets, auto scan, 8 tour, 5 pattern, auto pan, Tripwire, Intrusion, Abandoned/Missing , Face Detection, Heat Map, IR Range of 200 Mtr., Max 300° /s pan speed, 360° endless pan rotation, Built-in 7/2 alarm in/out, Micro SD card 256GB, IP67, IK10, Support PoE+, UL, CE ,FCC certified as per the specifications.	Each	56785.00
27.18	Supplying , installation , testing and commissioning of 8 Channel NVR 2 Sata port Up to 16 channel IP camera input , Max 200Mbps incoming bandwidth ,Smart H.265+/H.265/Smart H.264+/H.264 dual codec decoding , Up to 8MP resolution preview and playback , Support 2 SATA HDDs up to 6 TB each, 2 USB(1 USB3.0, 1 USB2.0) , 1 HDMI / 1 VGA simultaneous video output ,ONVIF Version 2.4 conformance , Alarm In / out 4/2 , Two way talk 1 Channel Input, 1 Channel Output RCA , 1 RJ-45 port (10/100/1000Mbps) as per the specifications.	Each	9515.00
27.19	Supplying , installation , testing and commissioning of 16 Channel NVR 2 Sata port Up to 16 channel IP camera input , Max 200Mbps incoming bandwidth ,Smart H.265+/H.265/Smart H.264+/H.264 dual codec decoding , Up to 8MP resolution preview and playback , Support 2 SATA HDDs up to 6 TB each, 2 USB(1 USB3.0, 1 USB2.0) , 1 HDMI / 1 VGA simultaneous video output ,ONVIF Version 2.4 conformance , Alarm In / out 4/2 , Two way talk 1 Channel Input, 1 Channel Output RCA , 1 RJ-45 port (10/100/1000Mbps) as per the specifications.	Each	10414.00
27.20	Supplying , installation , testing and commissioning of 32 Channel NVR 2 Sata port Up to 32 channel IP camera input , Max 200Mbps incoming bandwidth ,Smart H.265+/H.265/Smart H.264+/H.264 dual codec decoding , Up to 8MP resolution preview and playback , Support 2 SATA HDDs up to 6 TB each, 2 USB(1 USB3.0, 1 USB2.0) , 1 HDMI / 1 VGA simultaneous video output ,ONVIF Version 2.4 conformance , Alarm In / out 4/2 , Two way talk 1 Channel Input, 1 Channel Output RCA , 1 RJ-45 port (10/100/1000Mbps) as per the specifications.	Each	13875.00
27.21	Supplying , installation , testing and commissioning of 32 Channel NVR 4 Sata port Up to 32 channel IP camera input , Max 200Mbps incoming bandwidth ,Smart H.265+/H.265/Smart H.264+/H.264 dual codec decoding , Up to 8MP resolution preview and playback , Support 4 SATA HDDs up to 6 TB each, 2 USB(1 USB3.0, 1 USB2.0) , 1 HDMI / 1 VGA simultaneous video output , ONVIF Version 2.4 conformance , Alarm In / out 16/4 , Two way talk 1 Channel Input, 1 Channel Output RCA , 2 RJ-45 port (10/100/1000Mbps), 1 RS485, 1 RS232 as per the specifications.	Each	22482.00
27.22	Supplying , installation , testing and commissioning of 32 Channel NVR 8 Sata Port Up to 32 channel IP camera input , Max 320Mbps incoming bandwidth , Smart H.265+/H.265/Smart H.264+/H.264/MJPEG , Up to 12MP resolution preview and playback , Support 8 SATA HDDs up to 10TB each, 1 eSata , 4 USB(2 USB3.0, 2USB2.0) , 2 HDMI / 2 VGA simultaneous video output ,ONVIF Version 2.4 conformance , Alarm In / out 16/6 , Two way talk 1 Channel Input, 2 Channel Output RCA , 1 RS485, 1 RS232 , 2 RJ-45 port (10/100/1000Mbps), Support ANPR Camera as per the specifications.	Each	52199.00
27.23	Supplying , installation , testing and commissioning of 64 Channel NVR 8 Sata port Up to 64 channel IP camera input , Max 320Mbps incoming bandwidth , Smart H.265+/H.265/Smart H.264+/H.264/MJPEG , Up to 12MP resolution preview and playback , Support 8 SATA HDDs up to 10TB	Each	54216.00

Code No.	Description	Unit	Rate Rs.
	each,1 eSata , 4 USB(2 USB3.0, 2USB2.0) , 2 HDMI / 2 VGA simultaneous video output ,ONVIF Version 2.4 conformance , Alarm In / out 16/6 , Two way talk 1 Channel Input, 2 Channel Output RCA , 1 RS485, 1 RS232 , 2 RJ-45 port (10/100/1000Mbps), Support ANPR Camera as per the specifications.		
27.24	Supplying , installation , testing and commissioning of 128 Channel NVR 16 Sata port Up to 128 channel IP camera input , Max 384Mbps incoming bandwidth ,Support 16 SATA III ports, up to 8TB Each,1 eSATA port,Support iSCSI and Mini SAS to expand storage space , Support RAID 0/1/5/6/10/50/60 , 4 USB(2 USB3.0) , H.265/H.264 / MJPEG , Up to 12MP resolution preview and playback , 4 USB(2 USB3.0, 2USB2.0) , 2 HDMI / 1 VGA simultaneous video output ,ONVIF Version 2.4 conformance , Alarm In / out 16/8 , Two way talk 1 Channel Input, 1 Channel Output RCA , 1 RS485, 1 RS232 , 4 RJ-45 port (10/100/1000Mbps),1 Mini SAS port for storage expansion ,Support N+M ,Support ANPR Camera as per the specifications.	Each	139215.00
27.25	Supplying , installation , testing and commissioning of 4 Port POE Switch 10/100 4 Port PoE with 2 10/100 Mbps Uplink ,Power Budget 60 Watt , Max 30 watt per port as per the specifications.	Each	2357.00
27.26	Supplying , installation , testing and commissioning of 4 Port Industrial POE Switch 10/100/1000 4 Port with 2 Giga SFP Uplink, Industrial POE Switch, Support Dual DC Power Backup as per the specifications.	Each	10205.00
27.27	Supplying , installation , testing and commissioning of 8 Port Giga PoE Switch 10/100/1000 8 Port with 2 GigaJ 45 uplink, PoE switch ,AI Extend , AI Vlan as per the specifications.	Each	5704.00
27.28	Supplying , installation , testing and commissioning of 8 Port Managable PoE Switch 10/100/1000 8 Port with 2 Giga SFP uplink, L2 Managed PoE switch , Power Budget max 96 W , single port 30 W ,AI Extend , AI VLAN as per the specifications.	Each	7615.00
27.29	Supplying , installation , testing and commissioning of 8 Port Industrial POE Switch 10/100/1000 8 Port with 4 Giga SFP Uplink, Industrial POE Switch , Support Dual DC Power Backup as per the specifications.	Each	12934.00
27.30	Supplying , installation , testing and commissioning of 16 Port PoE Switch 10/100 16 Port with 2Giga & 2 SFP Combo Uplink Ports, PoE switch 150W ,Single Port Max 30W as per the specifications.	Each	12555.00
27.31	Supplying , installation , testing and commissioning of 16 Port Giga PoE switch 10/100/1000 16 Port with 2 Giga SFP uplink, PoE switch Power Budget 150 watt ,Single Port Max 30W , AI Extend ,AI VLAN as per the specifications.	Each	14114.00
27.32	Supplying , installation , testing and commissioning of 24 Port PoE Switch 10/100 24 Port with 2Giga & 2 SFP Combo Uplink Ports, Power Budget 250W as per the specifications.	Each	14505.00
27.33	Supplying , installation , testing and commissioning of 24 Port Giga PoE Switch 10/100/1000 24 Port with 2 Giga SFP Uplink, PoE switch , PoW Powe Budget 250W as per the specifications.	Each	17417.00
27.34	Supplying , installation , testing and commissioning of 24 Port Managable POE Switch 10/100/1000 24 Port Managed PoE Switch with 2 Giga RJ45 & 2 Giga SFP combo uplink, Power Budget250W as per the specifacatons.	Each	20546.00
27.35	Supplying , installation , testing and commissioning of of 1 TB Surveillance Hard disk drive Complete as required	Each	3152.00
27.36	Supplying , installation , testing and commissioning of 2 TB Surveillance Hard disk drive Complete as required	Each	4959.00
27.37	Supplying , installation , testing and commissioning of 4 TB Surveillance Hard disk drive Complete as required	Each	8130.00
27.38	Supplying , installation , testing and commissioning of 6 TB Surveillance Hard disk drive Complete as required	Each	12402.00
27.39	Supplying , installation , testing and commissioning of 8 TB Surveillance Hard disk drive Complete as required	Each	18407.00
27.40	Supplying , installation , testing and commissioning of 8 Port Non PoE Giga Byte Switch 10/100/1000 8 Port Gigabit Network Switch as per the specifications.	Each	1977.00

Code No.	Description	Unit	Rate Rs.
27.41	Supplying , installation , testing and commissioning of 16 Port Non PoE Giga Byte Switch 10/100/1000 16 Port Gigabit Network Switch as per the specifications.	Each	5978.00
27.42	Supplying , installation , testing and commissioning of 24 Port Non PoE Giga Byte Switch 10/100/1000 24 Port Gigabit Network Switch as per the specifications.	Each	6428.00
27.43	Supplying , installation , testing and commissioning of 24 Port Non PoE Managable Giga Byte Switch 10/100/1000 24Port Gigabit Managed L3 Network Switch with 4 Gigabyte SFP Port	Each	22090.00
27.44	Supplying , installation , testing and commissioning of 4U Indoor Rack Wallmount 4U 400D With Front Glass Door Lock & Key 550 4U - (fan; cable manager; PDU) complete as required.	Each	2662.00
27.45	Supplying , installation , testing and commissioning of 6U Indoor Rack Wallmount 6U 450D With Front Glass Door Lock & Key 550 6U - loaded with cable manager + PDU + Fan complete as required.	Each	2981.00
27.46	Supplying , installation , testing and commissioning of 9U Indoor Rack Wallmount 9U 630D With Front Glass Door Lock & Key 550 9U - (with 1U cable Manager;Fan;6 socket PDU) complete as required.	Each	3543.00
27.47	Providing installation testing and commissioning of 12U Indoor Rack Wallmount 12U 450D With Front Glass Door Lock & Key 550 12U - (Fan, cable manager, PDU included) complete as required.	Each	4437.00
27.48	Providing installation testing and commissioning of 15U Indoor Rack Wallmount 15U 630D With Front Glass Door Lock & Key 550 15U - (Fan, cable manager, PDU included) complete as required.	Each	7728.00
27.49	Supplying, installation, testing and commissioing of following size LED Monitor, table/wall mount with inbuild speaker minimum 5Wx2,with minimum 1 No of HDMI and USB port including remote control, connecting cable, batteries, and all accessories, connection etc complete as per specification.		
27.49.1	32 inch	Each	18612.00
27.49.2	43 inch	Each	36701.00
27.49.3	49 inch	Each	47620.00
27.49.4	55 inch	Each	54161.00
27.50	Supplying, installation testing and commissioning of standard/ short/long throw multimedia projector with display device- DLP technology and above, minimum No. of pixels 1024x768, computer compatibility- UXGA/WXGA/SXGA/XGA, minimum life of light source-5000 hours, network terminal wired/ wireless with inbuilt speaker including all accessories and specifications as per site requirement.		
27.50.1	Brightness: 3000 Lumens	Each	27879.00
27.50.2	Brightness: 4000 Lumens	Each	45374.00
27.50.3	Brightness: 5000 Lumens	Each	133758.00
27.51	Supply and installation of Wallmount motorized projector screen, 1080p, 3D and 4k supported display technology, including all accessories and specification as per site requirement	Sqft	267.00
SMALL EPABX SYSTEM			
27.52	Supply, installation , testing and commissioning for basic small EPABX cabinet with expandable upto 40 port with CPU and power supply	Each	8913.00
27.53	Supply, installation , testing and commissioning of add on card for analogue extension per port.	Each	1080.00
27.54	Supply, installation , testing and commissioning of add on card for digital extension per port	Each	1289.00
27.55	Supply, installation , testing and commissioning of add on card for analog trunk per port	Each	1109.00
27.56	Supply, installation , testing and commissioning of add on item extra CPU card	Each	9612.00
27.57	Supply, installation , testing and commissioning of add on item extra PSU card	Each	8215.00
27.58	Supply, installation , testing and commissioning of add on item operator console	Each	7027.00

Code No.	Description	Unit	Rate Rs.
27.59	Supply, installation , testing and commissioning of add on item digital phone 2 row display with DSS key	Each	7517.00
27.60	Supply, installation , testing and commissioning of add on item push button caller ID phone with speaker.	Each	809.00
	LARGE EPABX SYSTEM		
27.61	Supply, installation , testing and commissioning for basic EPABX system cabinet expandable upto 224 port with CPU card and power supply.	Each	53934.00
27.62	Supply, installation , testing and commissioning of add on card for standby CPU card.	Each	24948.00
27.63	Supply, installation , testing and commissioning of add on card for stand by PSU card.	Each	16103.00
27.64	Supply, installation , testing and commissioning of add on card for analogue extension card per port.	Each	1170.00
27.65	Supply, installation , testing and commissioning of add on card for Digital expression card per port.	Each	1245.00
27.66	Supply, installation , testing and commissioning of add on card for analog trunk card per port.	Each	1109.00
27.67	Supply, installation , testing and commissioning of add-on item for operator console (for large EPABX)	Each	7027.00
27.68	Supply, installation , testing and commissioning of add on item for Digital phone 2 row with DSS key. (for large EPABX)	Each	7517.00
27.69	Supply, installation , testing and commissioning of add on item for push button caller ID phone and speaker. (for large EPABX)	Each	809.00
27.70	Supply, installation , testing and commissioning of add on item junction box installed with Mount frame inside for Krone 10 pair disconnection/disconnections module, Corrosion free impact resistant, water proof, mild steel stable and maintenance free with same size crone module as junction box.		
27.70.1	20 Pair Junction box	Each	2499.00
27.70.2	50 Pair Junction box	Each	3924.00
27.70.3	100 Pair Junction box	Each	8913.00
27.70.4	200 Pair Junction box	Each	17296.00
27.71	Supply, installation , testing and commissioning of single line cordless phone with display and speaker 2.4 GHz frequency supported Ni-MH battery, redial memory.	Each	3924.00
27.72	Supply, installation , testing and commissioning of single line cordless phone with dialling display and speaker 2.4 GHz frequency supported Ni-MH battery, redial memory.	Each	4808.00
27.73	Supply, installation and testing for HDMI cable.	Metre	393.00
27.74	Supply installation and testing for VGA cable	Metre	322.00

Code No.	Description	Unit	Rate Rs.
27.75	Supplying, installation, testing & Commissioning of Media Convertor 10/100/ 1000 gigabit with specification TP Port Rate-10/100Mbps N-Way Auto-negotiation, Fiber Port Rate - 100Mbps Duplex Mode - Full-Duplex / Half-Duplex N-Way Auto-negotiation UTP Ports -RJ-45 UTP Fiber Ports -SC Distance - 0~2 Kms LED Indicators - TX LINK, FX LINK, TX ACT, FX ACT, PWR, FDX. Power Requirement - 5VDC 2A Ambient Temp.- 0~60°C Humidity : 5%~90% FCC Part -15 Class A & CE Marks	Each	12159.00
27.76	Supplying, installation, testing & Commissioning of SC-SC Patch Card Length up to 2 Mtr. for Optical Fiber Connector Type- SC / ST / FC / LC, MTRJ, Optical Fiber- Corning single-mode G652D, G657A, G657B, Cable Type- PVC & LSZH on request 0.9mm/2.0mm/3.0mm Simplex & duplex, Cable Color-yellow, Insertion Loss-≤0.2dB, Max. 0.3dB, Return Loss->PC≥45dB, UPC≥50 dB, APC≥60dB, Fiber Height-±100nm, Connector Ferrule Ceramic, (MTRJ: PS- Polyphenylene Sulfide)	Each	573.00
27.77	Supplying, Installation, Testing & Commissioning of Patch Panel Fully Loaded with Specification of Standard 19" rack mount, accommodates 25x50 mm USO II modules, designation strips and white paper inserts, panel mounting screws and washers, White/writeable labels for port identification.	Each	7814.00
27.78	Supplying, Installation, Testing and Commissioning of CAT 6 Patch Cord Length up to 2 Mtr. with specification of 4 Pairs Unshielded Twisted Pair (UTP) Cable, Conductor Metal: Bare Copper Conductor , 24 AWG, Insulation Material: HD-PE, Jacket Material: PVC UL94V-0, Heat-resistant: 60 degree C minimum , Flame property: The purpose of the vertical flame test is to screen out flammable wires. It follows the VW-1 (UL); FT-1 (CSA) standards.	Each	255.00
27.79	Supplying, Installation, Testing and Commissioning of load balancer with feature of Standards and Protocols- IEEE 802.3, 802.3u, 802.3x, TCP/IP, DHCP, ICMP, NAT, PPPoE, SNTP, HTTP, DDNS, Interface type -1fixed WAN,3changeable WAN/LAN, Flash-160 MB, DRAM-128MB, Security-FTP/SIP/PPTP/IPsec/H.323 ALG, DoS Defense, Ping of Death IP/MAC Binding, Bandwidth Control, Session Limit, Dynamic DNS, UPnP, Time Setting, Daylight Saving Time, SNMP, Diagnostics, Firmware Upgrade, Factory Defaults/Reboot, Backup/Restore, System Log, Remote Management, Statistic	Each	50532.00
27.80	Supplying, Installation, Testing and Commissioning of Coupler for LIU with Feature - Compact design, TIA/EIA, and IEC compliance, alignment with high precision Low insertion and return loss, Self adjusting metal panel clips ,Duplex adapter SC footprint, Screw-type locking is stable and reliable ,Square-type design ,Threaded with nuts or snap-in coupling Body: zinc alloy for long life D-shaped and rectangular mounts .	Each	148.00
27.81	Supplying & laying of 4 core Optical Fiber Cables for 9/125 Ohm Single mode installation , Om3 type suitable for 10Gb Ethernet Network bend Insensitive , Aqua LSZH Sheath , glass strands Euro class Tiger- buffer 900, Colour code for tag compliant with EN 50173-2 and ISO-IEC 11801 standard , Except for Tight-Buffer Om4	P.Mtr.	92.00
27.82	Supplying, Installation, Testing and Commissioning of pigtail SC Single Mode Fiber Pigtail Length up to 2 Mtr. , consists of 9/125 micron bulk single mode fiber cable. Fiber optic pigtails are used to achieve accurate mounting for precision alignment of fiber optical components Multi Mode, Diameter-0.9mm, Jacket Material- LSZH , Connector Type LC, SC, ST , Insertion Loss less than 0.2dB	Each	531.00
27.83	Supplying, installation, testing & Commissioning of LIU 24/48 Port speed supported 10/100/1000 GB, Configurable. Fiber LIU drawer type is a 1U rack mount unit for storing and terminating incoming fiber cable. Management rings within system to accommodate excess fiber cordage behind the adapters and maintain fiber bend radius.	Each	28131.00
27.84	Supplying , Installation, Testing & Commissioning Of 4 MP Network Motorized Face Recognition Camera 1/3" 4MP PS CMOS, Image Sensor (0.85cm) , Max 5/30fps@4Mp(2688×1520) H.265+ and H.264+ triple-stream encoding WDR(120dB), Day/Night(ICR), 3DNR, AWB, AGC, BLC,	Each	115891.00

Code No.	Description	Unit	Rate Rs.
27.85	HLC 2.7 -13.5mm Motorized Lens IR Range of 50 Mtrs, Micro SD Card, IP67, IK10, ePoE, PoE CMS. Supplying , Installation ,Testing & Commissioning Of 32 GB SD Card Flash Memory Type Micro SDHC, SDXC Memory Storage Capacity 32 GB Compatible Devices Tablet, Camera, Smartphone, multi Colour Printer ,Special Feature X-Ray Proof, Water Proof, Temperature Proof, Drop Proof Read Speed 120 Mega bytes Per Second.	Each	713.00
27.86	Supply Installation Testing & Commissioning of 6U Outdoor Rack Technical Data: DIN Std. 10mm Sq. Slots Basic Frame Construction Top & Bottom Cover Front Door 19 "Mounting Angle Std. Equipment Mounting Standard Finish Rack Standard load capacity - upto30 Kg (Uniformly distributed in U Space)/ 2KG Per U	Each	14487.00
27.87	Supply Installation Testing & Commissioning of 42U Rack. Outdoor IP55 security rack cabinet for floor mounting. Contains 42U high rails in a19" rack format compatible with any Rack-type accessory. Box or cabinet prepared to place on the floor. Front door with triple point locks to prevent unauthorized access or vandalism Cabinet with IP55 protection, dustproof and complete protection against solid objects. Secured against jets of water projected from any angle. As an optional accessory, a module with 4 fans can be mounted on its upper part. It has side vents for proper ventilation. At its base it has a plate with glands for the passage of wiring. Load capacity up to 600 kilos.	Each.	79118.00
27.88	Supplying and Laying of 6 Core Armoured / Outdoor Optical Fiber cable Generally confirming to EIA/TIA 568-C.2 and IEC/ISO11801 Excellent Margin with suppression of Cross Talk (NEXT) 4 Pair Separator Design 23 AWG cable For Outdoor installation With Laying Cable Underground With Suitable Size PVC Conduit/Casing Capping and Other Accessories as per requirement.	P.Mtr.	109.00
27.89	Supplying, Installation, Testing & Commissioning of 12 Port LIU Fully Loaded 12 port LIU with Single Mode SC Connectors, Rack Mountable, Modular enclosure for cross connect and interconnect capabilities, Rubber fiber slotted bracket built-in, metal splice shelf to protect the fibers.	Each	9806.00
27.90	Supplying , Installation, Testing & Commissioning of Fiber Patch cord / Pigtail cable LC / UPC, LC / APCIL =< 0.3dB RL >= 50dB LC 2.0/3.0mm Simplex Patch Cord LC 2.0/3.0mm Duplex Patch Cord Options with multimode OM3, OM4, OM5 and single-mode OS2 G.657 Length up to 2 Mtr.	Each	1282.00
27.91	Supply, Installation , Testing and Commissioning of OFC Junction Box Fully Loaded fiber Optic Joint Termination Enclosure Box with OFC Splicing Tray , JC BOX ,Tiffin Type JC Durable Construction: Crafted from robust Plastic, ensuring longevity and protection for fiber optic joints Sleek Modern Design: Blends seamlessly with contemporary setups, Easy Installation: Screw-In installation type allows for Space-Efficient: Includes 5- 10 Fiber Optic Joint Termination Enclosure Boxes, perfect for multi-joint applications.	Each	535.00
27.92	Supplying & Laying Of 0.5 mm 20 Pair Jelly Field Armoured Telephone Cable etc as required .	P.Mtr.	312.00
27.93	Supplying and laying Of CAT 6 Outdoor Cable Solid Annealed Bare Copper Conductor. LLD PE/PE Sheath Material For Video Power and Audio Communication With Laying Cable Underground With Suitable Size PVC Conduit/Casing Capping and Other Accessories as per requirement.	P.Mtr.	88.00
27.94	Supplying , Installation, Testing & Commissioning Of VOIP ISDN Gateway Approved Make For Optical Pri With Of Standard SIP (RFC3261, RFC 2833),H.323 IP Subscriber/Trunk SIP Info / In band DTMF Detection & generation, In band PPPoE DHCP / Static IP / VLAN, SNMP	Each	62410.00
27.95	Supplying , Installation, Testing & Commissioning of FCBC (float cum boost charger) 48 V 10 Amp with Wide Input Voltage Range, Potential Free Contacts for Remote Fault Annunciation Analog Controller, Input High Voltage Disconnect (HVD) & Battery Low Voltage Disconnect (LVD)	Each	55034.00

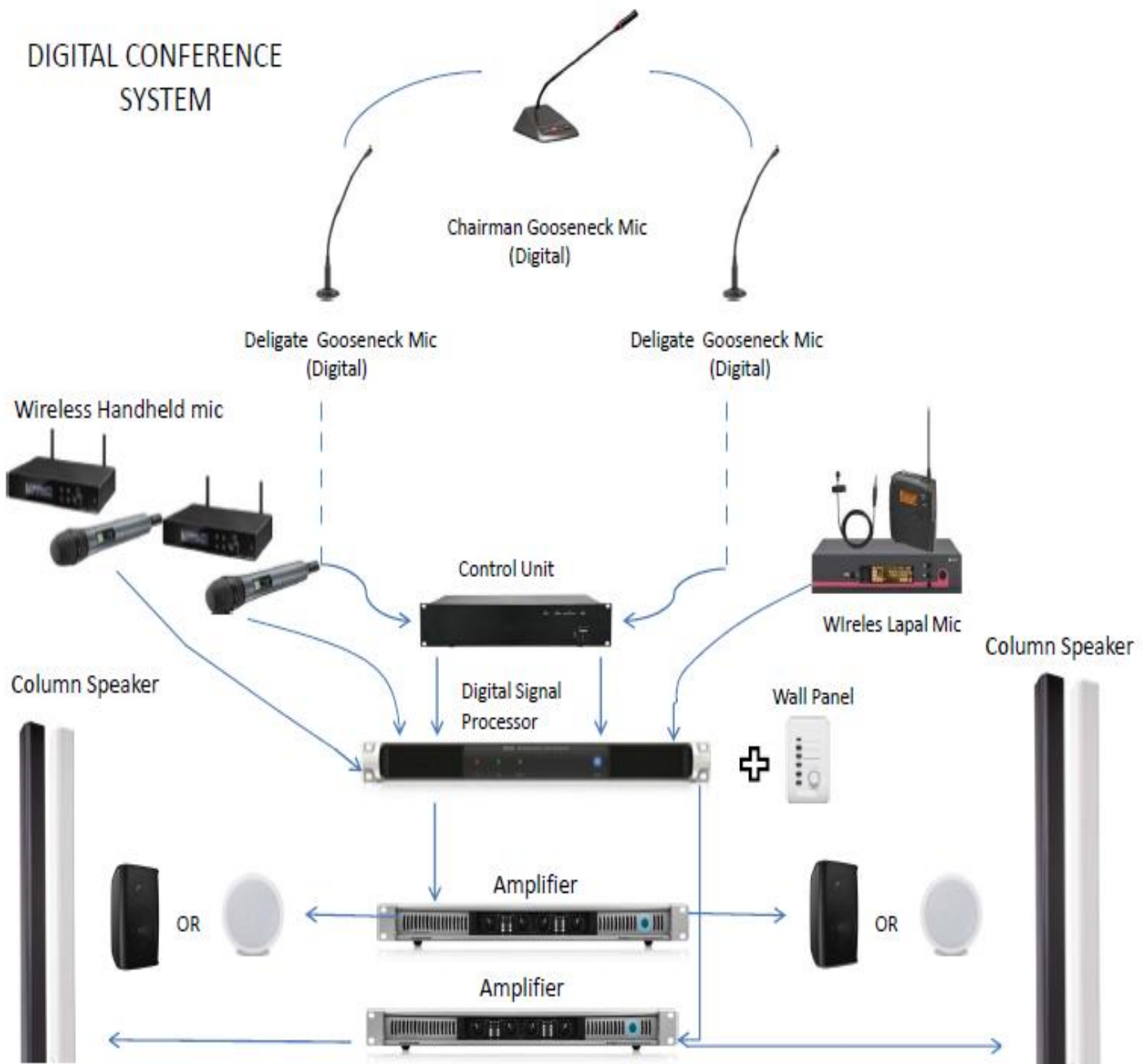
CHAPTER 28 – SOUND SYSTEM

All works shall be carried out as per item of work, Sound System Works using material as specified by the manufacturers of that item, as per relevant BIS specifications and as per additional specifications attached with tender documents:

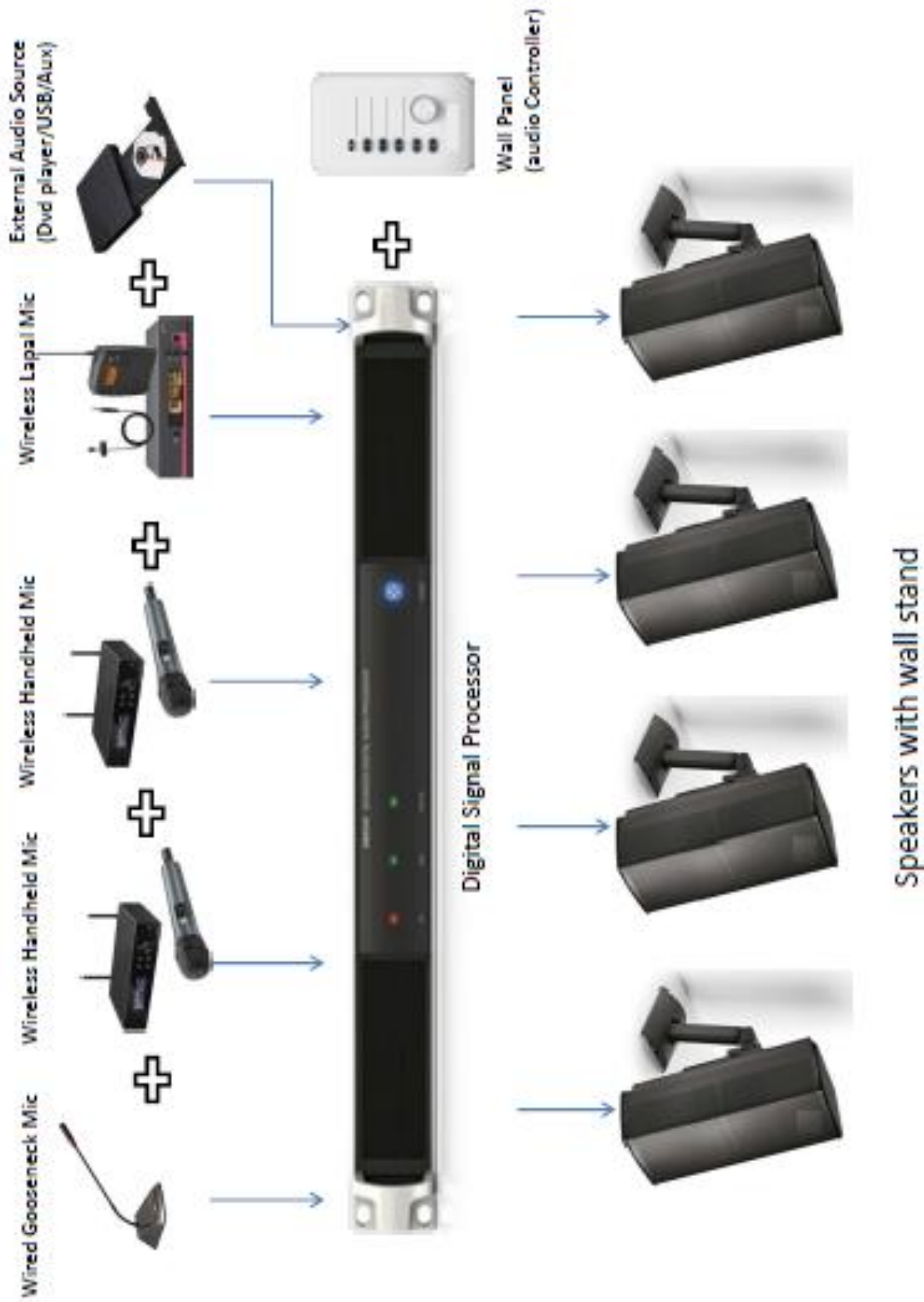
(A) **MEASUREMENT:**

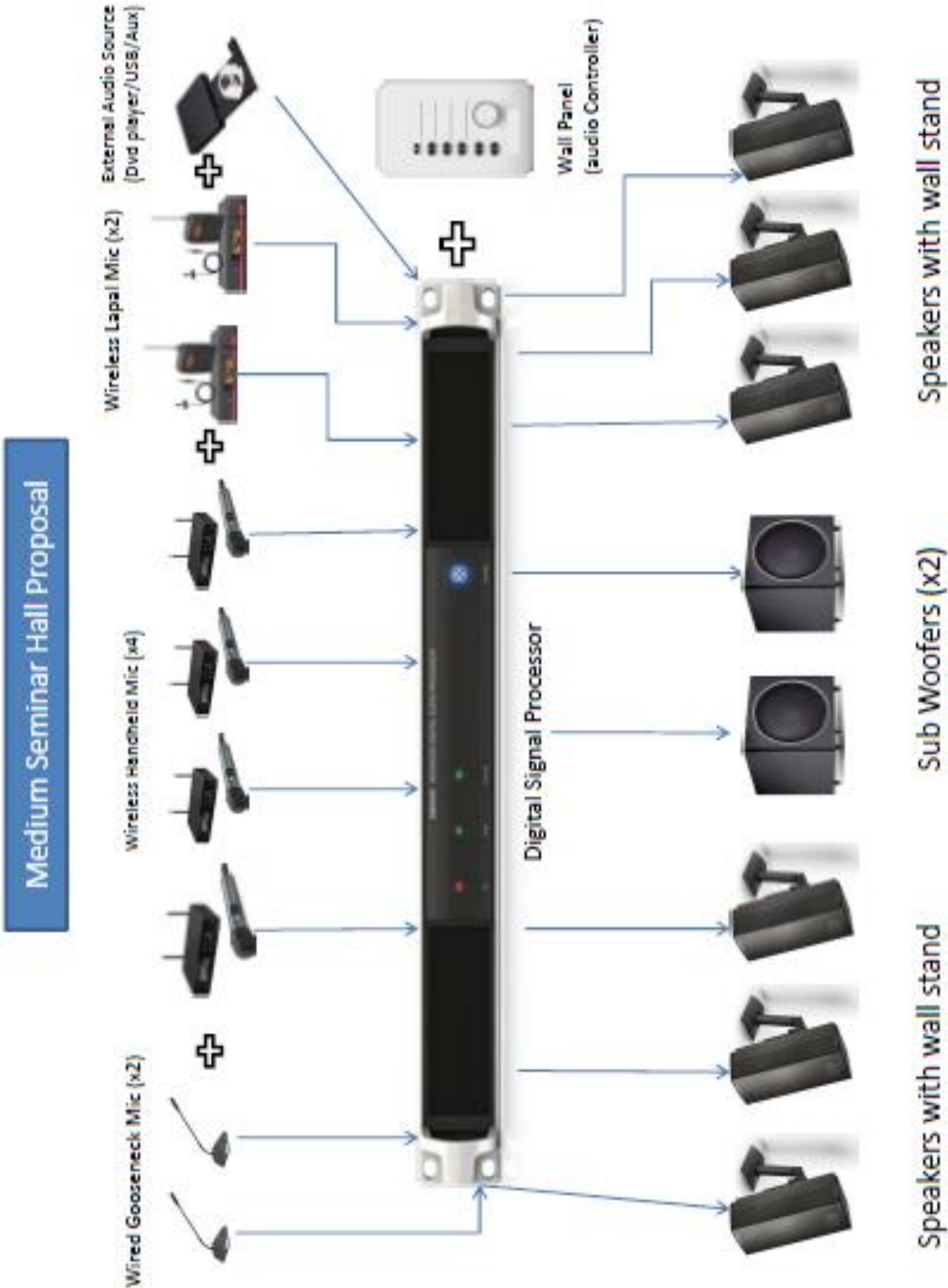
All items shall be measured in by counting in numbers.

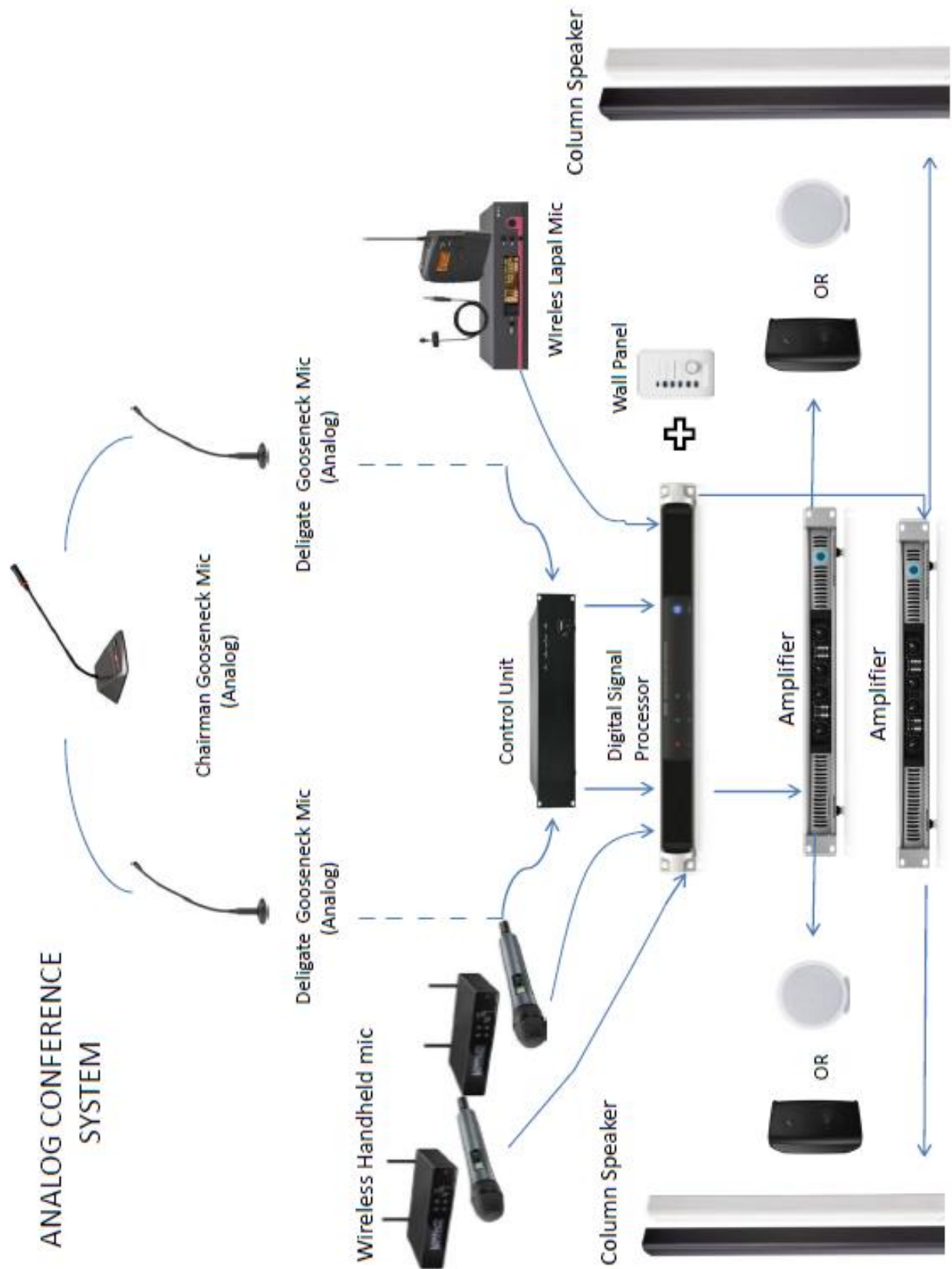
(B) **RATE:** The rate of items includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

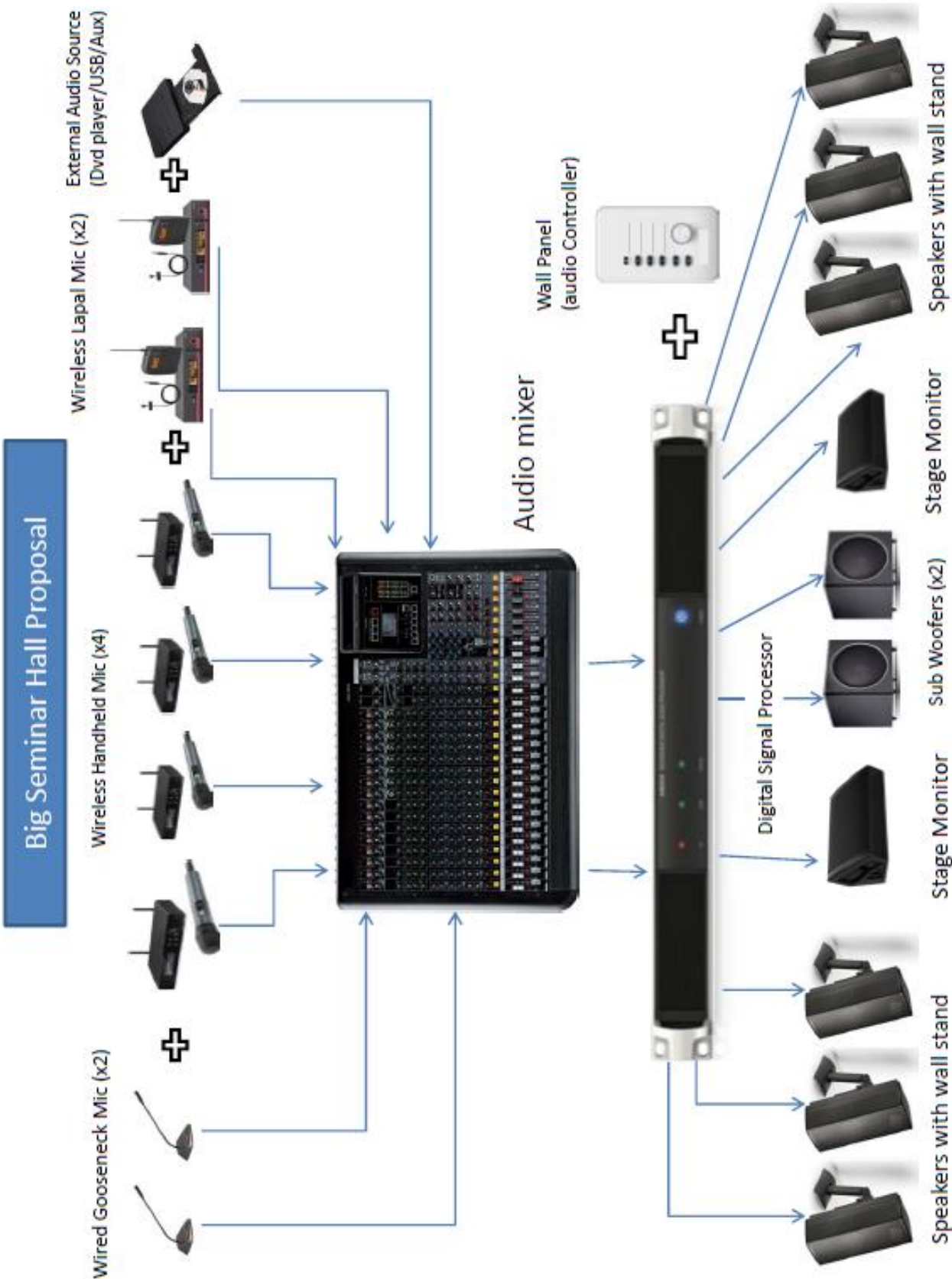


Small Seminar Hall Proposal









CHAPTER 28 - Sound System

Code No.	Description	Unit	Rate Rs.
28.1	Supplying , installation , Testing and Commissioning of Digital Conference discussion units with Anti RF System , Long stem goose neck microphone, headphone socket and volume control DSP Feature YES (Built in DSP Auto Mixer) Microphone Length 18" to 24" (Two flexible parts) Microphone LED Ring YES Frequency Response (+/-3dB) 100Hz - 15kHz S/N 75-80 dB Microphone On/Off Button YES with all necessary terminals and Connectors.	Each	27363.00
28.2	Supplying , installation , Testing and Commissioning of Digital Central controller Built-in Wav and MP3 Recorder to external USB memory devices, Built-in feedback suppressor and digital audio processing (DSP), DSP Feature YES (Built in DSP Auto Mixer), Mic Connecting Capability Master control unit handles can control upto 240 units, Recording Capability Inbuilt 1GB memory or USB device, Should have Feedback Suppresion and Browser Application with all necessary terminals and Connectors.	Each	125605.00
28.3	Supplying , installation , Testing and Commissioning of 2 Meters Digital Conference System Signal Cable Compatible with respective conference System with all necessary terminals and Connectors.	Each	3375.00
28.4	Supplying , installation , Testing and Commissioning of 5 Meters Digital Conference System Signal Cable Compatible with respective conference System with all necessary terminals and Connectors.	Each	6650.00
28.5	Supplying , installation , Testing and Commissioning of 15 Meters Digital Conference System Signal Cable Compatible with respective conference System with all necessary terminals and Connectors.	Each	8293.00
28.6	Supplying , installation , Testing and Commissioning of 50 Meters Digital Conference System Signal Cable Compatible with respective conference System with all necessary terminals and Connectors.	Each	26563.00
28.7	Supplying , installation , Testing and Commissioning of UHF Wireless Cardioid Condenser handheld microphone system with Frequency Response of 60 Hz to 16 kHz , RF Sensitivity 10dB μ V (S/N 60dB @ 20 kHz deviation) or better, Total Harmonic Distortion <1.0% (at 1 kHz, $\pm$ 20 kHz deviation) or better, Dynamic Range > 108dB or better, on/off switch operating range 60 mtrs or better, RF Power Output: 10 mW or better, maximum Output level XLR / Balanced: +4 dBV & 6.3 mm ($\frac{1}{4}$ ") / Unbalanced: -2 dBV with all necessary terminals and Connectors.	Each	31306.00

Code No.	Description	Unit	Rate Rs.
28.8	Supplying , installation , Testing and Commissioning of UHF Wireless Cardioid Condenser lapel microphone system with Frequency Response of 60 Hz to 16 kHz , RF Sensitivity 10dB μ V (S/N 60dB @ 20 kHz deviation) or better, Total Harmonic Distortion <1.0% (at 1 kHz, $\pm$ 20 kHz deviation) or better, Dynamic Range > 108dB or better, on/off switch operating range 60 mtrs or better, RF Power Output: 10 mW or better, maximum Output level XLR / Balanced: +4 dBV & 6.3 mm (1/4") / Unbalanced: -2 dBV with all necessary terminals and Connectors.	Each	34955.00
28.9	Supplying , installation , Testing and Commissioning of Advanced digital audio processor with open architecture software-configurable functionality Comprehensive library of DSP algorithms optimised for installation applications, 8 Channels of wide band Acoustic Echo Cancellation (AEC) for telephone and video conferencing, Auto mixer functionality for multiple microphone applications, Optional Dante card for IP-based audio networking, PC-based software with intuitive graphical user environment, 10 high-headroom analogue universal mic/line inputs, 6 electronically balanced low impedance line level outputs, USB audio connection for integration with computer based audio, ULTRANET digital audio transport output for connection to compatible devices Ethernet port for software configuration via CAT5/5e cable with all necessary terminals and Connectors.	Each	143364.00
28.10	Supplying , installation , Testing and Commissioning of Digital wall panel controller Remote Control for Volume and Source Selection with all necessary terminals and Connectors.	Each	7602.00
28.11	Supplying , installation , Testing and Commissioning of Wall Mounted two way full Range speaker with Minimum 2 x 3.5" LF or 1 x 5.25" LF or better with 1" HF with a Frequency Response(-10dB):- 65Hz-20Khz & Long Term Program Power Handling of 120W or more. The Loudspeaker should have a Sensitivity(1W/1m) of atleast 90dB with a Max. Peak SPL of >114dB. Speaker should have 70/100 volt transformer taps with upto 60 watts tapping. The Sound Dispersion should be 90x70 Degrees or better complete with wall mount Bracket of same OEM with all necessary terminals and Connectors.	Each	32456.00
28.12	Supplying , installation , Testing and Commissioning of Passive Column Array Loudspeaker with 7 Mid Range Drivers and FAST Dispersion Control for Installation Applications (EN 54 Certified), 7 x 3.5" full range drivers with 150 W RMS Power @ 8 Ohms with all necessary terminals and Connectors.	Each	65674.00
28.13	Supplying , installation , Testing and Commissioning of Compact Full Range 4" Ceiling Speaker with 40 W RMS power @ 8 Ohms , 70 V/100V: 30 W / 15 W / 7.5 W with all necessary terminals and Connectors.	Each	10913.00

Code No.	Description	Unit	Rate Rs.
28.14	Supplying , installation , Testing and Commissioning of 4 Channel Audio Amplifier Professional 300-Watt (Per channel 70 to 80 Watts into 4 Ohms OR Per channel 40 to 60 Watts into 8 Ohms) Light Weight 4-Channel Power with all necessary terminals and Connectors.	Each	21981.00
28.15	Supplying , installation , Testing and Commissioning of Dual Channel Audio Amplifier Professional 1700-Watt (Per Channel 700 to 800 Watts into 4 Ohms OR Per channel 400 to 500 Watts into 8 Ohms OR 1600 to 2000 Watts into 8 Ohms (bridge mode)Stereo with all necessary terminals and Connectors.	Each	29915.00
28.16	Supplying , installation , Testing and Commissioning of Mono Connectors Pin with all necessary terminals and Connectors.	Each	536.00
28.17	Supplying , installation , Testing and Commissioning of RCA Connectors Pin with all necessary terminals and Connectors.	Each	315.00
28.18	Supplying , installation , Testing and Commissioning of MXLR (Male External Line Return) Connectors Pin with all necessary terminals and Connectors.	Each	484.00
28.19	Supplying , installation , Testing and Commissioning of FXLR (Female External Line Return) Connectors Pin with all necessary terminals and Connectors.	Each	484.00
28.20	Supplying , installation , Testing and Commissioning of EP 3.5 MM Connectors Pin with all necessary terminals and Connectors.	Each	315.00
28.21	Supplying , installation , Testing and Commissioning of MXLR Connector Socket with all necessary terminals and Connectors.	Each	563.00
28.22	Supplying , installation , Testing and Commissioning of FXLR Connectors Socket with all necessary terminals and Connectors.	Each	563.00
28.23	Supplying , installation , Testing and Commissioning of Patch box with 04 connetors options for mic & stage monitor	Each	14014.00
28.24	Supplying , installation , Testing and Commissioning of 2.5Sq.mm Speaker cable Cross sec Area 1.5 Sqmm, No of Strands 75 , Size of Strands 34 , Cond.Type ATC Speaker Cable - Copper 2Core, Twisted, Tin Coated, Shielded 2.5SQMM (70/.2) ATC 2/C SPEAKER CABLE 14AWG with all necessary terminals and Connectors.	Meter	398.00
28.25	Supplying , installation , Testing and Commissioning of Heavy Microphone Cable AWG NOM Insulation Dia. Shield NOM NOM Conductor Center Inches mm Construction Jacket Dia. Capacitance Resistance Canductor (Min.) Inches mm (Pf / mtr.) Ohm / km (Max.) 24 AWG 0.053 1.35 80% 0.232 5.9 68(Cond. To Cond.) 91.1 with all necessary terminals and Connectors.	Meter	398.00

Code No.	Description	Unit	Rate Rs.
28.26	Supplying , installation , Testing and Commissioning of Power Management (Constant Voltage / Frequency Stabiliser): Power Conditioner, with a built in 3 Way Sequencer that provides sequenced switching with a fixed interval, turning them on & off in a preset sequence. Adjustable Protection Levels : Over voltage 245-275 VAC Under voltage 170-220 VAC with Disable %-Over Frequency 50.5-55.0 hz with Disable Under Frequency 45.5-49.5 hz with Disable with all necessary terminals and Connectors.	Each	41591.00
28.27	Supplying , installation , Testing and Commissioning of 17U Equipment Rack, with Metal Side Panel, Back Door, Front Glass Door, Floor Wheel, 15u PDU Unit, Cooling FAN, Cable Manager, Counter Shelf with all necessary terminals and Connectors.	Each	26078.00
28.28	Supplying , installation , Testing and Commissioning of 22U Equipment Rack, with Metal Side Panel, Back Door, Front Glass Door, Floor Wheel, 15u PDU Unit, Cooling FAN, Cable Manager, Counter Shelf with all necessary terminals and Connectors.	Each	33834.00
28.29	Supplying , installation , Testing and Commissioning Cardioid Condenser Gooseneck Microphone with gooseneck length of 415mm or more. Flexible gooseneck head for accurate positioning. Shock Mount to be included with Microphone from same OEM with Frequency Response 70 Hz - 16,000 Hz; It shall be capable of handling sound input levels up to 134 dB with a dynamic range of 106 dB. Nominal open-circuit output voltage shall be 12.0 mV at 1 V, 1 Pascal or better, Signal-to-noise ratio of 66dB, 1kHz at 1Pa or better. Support 11V to 52V phantom power for operation. Impedance 100 ohms or better complete with Foam Windscreen with all necessary terminals and Connectors.	Each	16470.00
28.30	Supplying , installation , Testing and Commissioning Analog Chariman Unit Anti-RF, Length of Gooseneck Mic 15" -20", Priority Button, Mic On/Off, LED Ring Indicator on Mic, In built Speaker with all necessary terminals and Connectors.	Each	9892.00
28.31	Supplying , installation , Testing and Commissioning Analog Delegate Unit Anti-RF, Length of Gooseneck Mic 15" -20", Mic On/Off, LED Ring Indicator on Mic, In built Speaker with all necessary terminals and Connectors.	Each	9217.00
28.32	Supplying , installation , Testing and Commissioning Analog Control Unit should have USB player/Recording Capability, Support upto 20-40 Delegate Min, Line level output, Install configuration in a Bus Bar Arrangement, 19" Rackmountable with all necessary terminals and Connectors.	Each	41440.00
28.33	Supplying , installation , Testing and Commissioning Analog Extension Cable 02 Meters Long with all necessary terminals and Connectors.	Each	2099.00

Code No.	Description	Unit	Rate Rs.
28.34	Supplying , installation , Testing and Commissioning Analog Extension Cable 10 Meters Long with all necessary terminals and Connectors.	Each	6595.00
28.35	Supplying , installation , Testing and Commissioning Active Speaker 600 Watt 2 Way 10" Full Range Powered Loudspeaker with DSP Technology Components 1 x 10" LF driver 1 x 1" HF driver Connectors Mic/Line input: combo jack/female XLR wired pin 2 hot Mix out: male XLR wired pin 2 hot Frequency Range 55 Hz–18 kHz ± 3 dB 50 Hz–20 kHz -10 dB Dispersion @-6 dB pts 90° H x 60° V Max SPL (peak) 126 Db Equalisation Bass: ± 6 dB @ 80 Hz Treble: ± 6 dB @ 12 kHz Max Output Power LF: 500 W HF: 100 W with all necessary terminals and Connectors.	Each	42871.00
28.36	Supplying , installation , Testing and Commissioning Active Speaker 1100 Watt 2 Way 12" Full Range Powered Loudspeaker with DSP Technology Components 1 x 12" LF driver 1 x 1" HF driver Connectors Mic/Line input: combo jack/female XLR wired pin 2 hot Mix out: male XLR wired pin 2 hot Frequency Range 50 Hz–18 kHz ± 3 dB 45 Hz–20 kHz -10 dB Dispersion @-6 dB pts 90° H x 60° V Max SPL (peak) 128 dB Equalisation Bass: ± 6 dB @ 80 Hz Treble: ± 6 dB @ 12 kHz Max Output Power LF: 1000 W HF: 100 W with all necessary terminals and Connectors.	Each	52778.00
28.37	Supplying , installation , Testing and Commissioning Active Speaker 1100 Watt 2 Way 15" Full Range Powered Loudspeaker with DSP Technology Components 1 x 15" LF driver 1 x 1" HF driver Connectors Mic/Line input: combo jack/female XLR wired pin 2 hot Mix out: male XLR wired pin 2 hot Controls Level, Line/Mic, Low Cut, Speech/Music, Bass and Treble, Front LED, Mains on/off frequency Range 45 Hz–18 kHz ± 3 dB 40 Hz–20 kHz – 10 dB Dispersion @-6 dB pts 90° H x 60° V Max SPL (peak) 130 dB Equalisation Bass: ± 6 dB @ 80 Hz Treble: ± 6 dB @ 12 kHz Max Output Power LF: 1000 W HF: 100 W with all necessary terminals and Connectors.	Each	64509.00
28.38	Supplying , installation , Testing and Commissioning Active Speaker 2200 Watt 18" Powered Subwoofer Components 1 x 18" LF driver Connectors Input: 2 x female XLR wired pin 2 hot Thru: 2 x male XLR wired pin 2 hot Frequency Range 40 Hz–100 Hz ± 3 dB 30 Hz–150 Hz -10 dB Dispersion @-6 dB pts N/A Max SPL (peak) 134 dB (half space) Boost Frequency +6 dB @ 40 Hz–90 Hz, Q=1 Max Output Power 2200 W Input Sensitivity +4 dBu @ centre position for full rated power Input Impedance 10 kO unbalanced, 20 kO balanced with all necessary terminals and Connectors.	Each	111745.00
28.39	Supplying , installation , Testing and Commissioning 10-channel Compact Mixing System, 10 input channels (6 Mic/Line + 4 mic/Stereo-Line), 2 High-Quality editable effects, MIC input to Master A L/R outputs, +16 dBu, typical <0.01% Frequency Response, -3 dB, ref. 1 kHz, any input to any Mixer output 15 Hz to 20 kHz, Fader & FX/AUX/MON-Send attenuation > 75 dB	Each	34986.00

Code No.	Description	Unit	Rate Rs.
	Channel to Channel < -75 dB CMRR, MIC input, 1 kHz > 80 dB, Equivalent Input Noise, MIC input, A-weighted, 150 ohms -130 dBu with all necessary terminals and Connectors.		
28.40	Supplying , installation , Testing and Commissioning 24-channel Compact Mixing System, 24 input channels (16 Mic/Line + 4 Mic/Stereo-Line) 2 High-Quality editable effects, MIC input to Master A L/R outputs, +16 dBu, typical<0.01% Frequency Response, -3 dB, ref. 1 kHz, any input to any Mixer output 15 Hz to 20 kHz, Equivalent Input Noise, MIC input, A-weighted, 150 ohms -130 dBu with all necessary terminals and Connectors.	Each	42330.00
28.41	Supplying , installation , Testing and Commissioning Wall Hanging Arrangement for Speaker Metal Wall Bracket with necessary accessories to mount the speakers on wall with all necessary terminals and Connectors.	Each	5097.00

CHAPTER 29 - DISMANTLING

All works shall be carried out as per item of work and as per additional specifications attached with tender documents and taking all possible cares:

(A) MEASUREMENT:

For Item No 29.1 and 29.1 pre-measurement before execution of work shall be done by counting the points.

For items with unit each ans set shall be measured by counting in numbers and for items with units in metre shall be measured on linear basis in metres with least count as 1 cm.

For item no 29.13 for surface area length and breadth shall be measured in metre correct to 1 cm and area will be calculated in Sqm to 2 point of decimals.

(B) RATE: The Rate of item includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
29.1	Dismantling / taking out old point wiring from surface, PVC/steel conduit including wires, conduit, switch, socket, sheet, junction box cover etc. as per specification including making bundles, shifting of dismantled material to department store.	Point	17.00
29.2	Dismantling / taking out old circuit/ sub main wiring from surface of following sizes including, wires, conduit including making bundles, shifting of dismantled material to department store.		
29.2.1	Up to 6 sq. mm	Metre	3.00
29.2.2	Above 6 sq. mm and up to 25 sq. mm	Metre	4.00
29.3	Repairing wall/ ceiling surface along dismantled surface conduit point wiring by refilling the hole with cement mortar & finished with matching distemper/ paint.	Point	2.00
29.4	Repairing wall/ ceiling surface along dismantled surface circuit/ sub main wiring by refilling the hole with cement mortar & finished with matching distemper/ paint.	Metre	0.50
29.5	Dismantling the existing ceiling / exhaust fan / cabin fan with accessories including shifting of dismantled material to department store.	Each	20.00
29.6	Dismantling the all sizes indoor lighting luminaries from wall/ ceiling with accessories including shifting of dismantled material to department store.	Each	12.00
29.7	Dismantling the all sizes outdoor lighting luminaries from wall/ roof with accessories including shifting of dismantled material to department store.	Each	29.00
29.8	Dismantling the all sizes outdoor lighting luminaries from steel poles with accessories including shifting of dismantled material to department store.	Each	33.00
29.9	Dismantling the existing armoured / unarmoured power cable from surface including recoiling of dismantled cable and shifting to department store.		
29.9.1	Upto 35 Sqmm	Metre	2.00
29.9.2	Beyond 35 Sqmm and upto 95 Sqmm	Metre	3.00
29.9.3	Beyond 95 Sqmm and upto 185 Sqmm	Metre	2.00

Code No.	Description	Unit	Rate Rs.
29.9.4	Beyond 185 Sqmm and upto 400Sqmm	Metre	3.00
29.10	Dismantling of existing under ground power cable from ground and refilling the trench upto ground level including recoiling of dismantled cable and shifting to department store.		
29.10.1	Upto 35 Sqmm	Metre	36.00
29.10.2	Beyond 35 Sqmm and upto 95 Sqmm	Metre	36.00
29.10.3	Beyond 95 Sqmm and upto 185 Sqmm	Metre	37.00
29.10.4	Beyond 185 Sqmm and upto 400Sqmm	Metre	37.00
29.11	Dismantling of existing under ground power cable from pipe including recoiling of dismantled cable and shifting to department store.		
29.11.1	Upto 35 Sqmm	Metre	1.00
29.11.2	Beyond 35 Sqmm and upto 95 Sqmm	Metre	2.00
29.11.3	Beyond 95 Sqmm and upto 185 Sqmm	Metre	2.00
29.11.4	Beyond 185 Sqmm and upto 400Sqmm	Metre	3.00
29.12	Dismantling of DP/T.P/TPN switch or D.B. of following capacity from angle iron board/ cubical panel including shifting of dismantled material to department store.		
29.12.1	Upto 125 amps	Each	33.00
29.12.2	Above 125 amps	Each	42.00
29.13	Dismantling of angle iron board/ cubical panel including repairing the wall, shifting of dismantled material to department store. (front area to be measured)	Sqm	143.00
29.14	Dismantling of steel pole, R. S. joist, girder pole from the cement concrete foundation with bracket, insulators, stay wires etc, refilling the pit upto ground level including shifting of dismantled material to department store.	Each	667.00
29.15	Dismantling of stay set from the cement concrete foundation, refilling the pit upto ground level including shifting of dismantled material to department store.	Each	339.00
29.16	Dismantling the geyser or storage type water heater including shifting of dismantled material to department store.	Each	20.00

CHAPTER 30 – MINOR CIVIL WORKS

All works shall be carried out as per specifications mentioned in schedule of work for building works issued by E-in-C PWD Raipur from time to time.

(A) **MEASUREMENT:**

Measurement shall be done as specified in schedule of work for building works issued by E-in-C PWD Raipur from time to time.

(B) **RATE:** Rate of item includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item

Code No.	Description	Unit	Rate Rs.
30.1	Earth work in all type soil except soft rock / hard rock with all lead and 1.5 metre lift, dressing, stacking excavated strata including refilling of excavated soil in trench / pit to ground level complete as per specification.	cum	143.00
30.2	Earth work in soft rock with all lead and 1.5 metre lift, dressing, stacking excavated strata including refilling with excavated soil in trench / pit to ground level complete as per specification	cum	179.00
30.3	Earth work in hard rock (without blasting) with all lead and 1.5 metre lift, dressing, stacking excavated strata including refilling with excavated soil in trench / pit to ground level complete as per specification	cum	382.00
30.4	Earth work in hard rock (blasting prohibited) with wedging and chiseling with all lead and 1.5 metre lift, dressing, stacking excavated strata including refilling with excavated soil in trench / pit to ground level complete as per specification	cum	655.00
30.5	Filling of excavation stuff of any kind made available for filling except B.C. soil in layers including ramming and watering.	cum	57.00
30.6	Filling hard moorum in foundation or under floor in layers including ramming and watering.	cum	383.00
30.7	Providing timber / steel form work for cement concrete work at all levels including removing of the same.	Sqm	88.00
30.8	Providing brick masonry work in cement mortat 1:4 (1 cement : 4 coarse sand) with well burnt clay modular bricks having compressive strength not less than 25kg/Sqmm at all levels including scaffolding curing etc complete.	cum	3211.00
30.9	Plastering 15 mm thick on brick work/ CC surface with cement mortar 1:4 (1 cement : 4 fine sand) at all levels.	Sqm	91.00
30.10	Cement mortar 1:4 (1 cement : 4 coarse sand).	cum	2252.00
30.11	Cement mortar 1:4 (1 cement : 4 fine sand).	cum	2252.00
30.12	Providing and laying Cast-in-situ cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm including mixing with mechanical mixer, compacting with vibrator, finishing and currying etc. complete but excluding form work.	cum	2912.00

Code No.	Description	Unit	Rate Rs.
30.13	Providing and laying Cast-in-situ cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm including mixing with mechanical mixer, compacting with vibrator, finishing and currying etc. complete but excluding form work.	cum	2459.00
30.14	Structural steel work in single section including cutting, hoisting, fixing in position and applying a priming coat of red oxide zinc chromate primer.	kg	50.00
30.15	Applying priming coat on steel work with red oxide zinc chromate primer.	Sqm	14.00

CHAPTER 31 - MAINTENANCE

All works shall be carried out as per item of work using material as specified by the manufacturers of that item, as per relevant BIS specifications and as per additional specifications attached with tender documents:

(A) **MEASUREMENT:**

Item no 31.14 and 31.15 the surface area shall be measured in length and breadth/ height in metre correct to 1cm and then area will be calculated in Sqm correct to 2 decimal.

All other items i.e. item no 31.1 to 31.13 shall be measured in by counting in numbers.

(B) **RATE:** The Rate of item includes all cost of all material, fixing, hanging, supporting, installation materials, labour and machinery used in execution of work of shall be in the cost of item.

Code No.	Description	Unit	Rate Rs.
31.1	Rewinding of ceiling fan by copper enameled wire of suitable gauge including all other required material i.e. insulation varnish, connection leads, oiling greasing etc complete with testing including dismantling & refitting of fan at site. (old copper wire will become the property of contractor)		
31.1.1	48" (1200 mm sweep)	Each	297.00
31.1.2	56" (1400 mm sweep)	Each	307.00
31.2	Rewinding of Ex-Fan motor by copper enameled wire of suitable gauge including all other required material i.e. insulation varnish, connection leads, oiling greasing etc complete with testing including dismantling & refitting of fan at site. (old copper wire will become the property of contractor)		
31.2.1	12" (300mm) Ex. Fan	Each	326.00
31.2.2	15" (380mm) Ex. Fan	Each	342.00
31.2.3	18" (450mm) Ex. Fan	Each	367.00
31.3	Cleaning, overhauling, servicing of ceiling/ Exhaust / wall bracket fan including greasing/ oiling, replacement of safety pins, check nuts, lock nut, nut bolts etc. making perfect alignment including dismantling and refitting at site as per specification.	Each	82.00
31.4	Replacement of defective ball bearing by approved make of suitable size bearing of all size of ceiling fan during overhauling as per specification.	Each	51.00
31.5	Replacement of defective ball bearing by approved make of suitable size bearing of all size of ceiling fan including dismantling, disassembling, assembling and refitting as per specification.	Each	68.00
31.6	Replacement of defective ball bearing by approved make of suitable size bearing of all size of exhaust fan etc as per specification.	Each	55.00
31.7	Replacement of defective ball bearing by approved make of suitable size bearing of all size of exhaust fan including dismantling, disassembling, assembling and refitting as per specification.	Each	71.00
31.8	Supplying and replacing defective 2/3 KW heating element with approved make and suitable size in existing water heater/Gyser of any make, any	Each	156.00

Code No.	Description	Unit	Rate Rs.
	capacity.		
31.9	Supplying and replacing defective thermostat with approved make and suitable size in existing water heater/Gyser of any make, any capacity.	Each	159.00
31.10	Painting of ceiling fan in installed position with one or more coat of spray painting with synthetic enamel paint of approved brand and make to give an even shade including cleaning the surface with detergent as per specification.	Each	52.00
31.11	Painting of following height steel tubular poles with two coat of enamel paint of approved brand and colour including cleaning the surface as per specification:		
31.11.1	upto 6 metre	Each	77.00
31.11.2	Above 6 metre and upto 8 metre	Each	145.00
31.11.3	Above 8 metre and upto 10 metre	Each	198.00
31.11.4	Above 10 metre and upto 12 metre	Each	268.00
31.11.5	Above 12 metre and upto 14 metre	Each	309.00
31.12	Painting of following height steel tubular poles with two coat of aluminium paint of approved brand including cleaning the surface as per specification:		
31.12.1	upto 6 metre	Each	107.00
31.12.2	Above 6 metre and upto 8 metre	Each	164.00
31.12.3	Above 8 metre and upto 10 metre	Each	239.00
31.12.4	Above 10 metre and upto 12 metre	Each	328.00
31.12.5	Above 12 metre and upto 14 metre	Each	367.00
31.13	Painting of following height steel tubular poles with two coat of copper paint of approved brand including cleaning the surface as per specification:		
31.13.1	upto 6 metre	Each	90.00
31.13.2	Above 6 metre and upto 8 metre	Each	156.00
31.13.3	Above 8 metre and upto 10 metre	Each	233.00
31.13.4	Above 10 metre and upto 12 metre	Each	320.00
31.13.5	Above 12 metre and upto 14 metre	Each	358.00
31.14	Painting new steel and other metallic surface with red oxide zinc chromide primer paint complete with supply of material labour etc. including preparation of surface.	Sqm	99.00
31.15	Painting wood steel and other metallic surface with Aluminium Paint complete with material and labour including preparation of surface.	Sqm	122.00

CHAPTER 32 – SUPPLY ITEMS

All supply shall be received in good condition and sealed company packing. All material which are manufactured ISI marked should be recied ISI marked only. For other material good quality material of reputed and established brand should be recied.

(A) MEASUREMENT:

The items should be counted in number. For counting if packing is to be opened it should be opened. Fore wire bundels and cable drums the length written on packing may be taken in measurement.

(B) RATE: The Rate of item includes all cost of all material, packing, forwarding, transit insurance, loading, transportation to departmental store, unloading at departmental store, stacking as per the direction of engineer etc.

Code No.	Description	Unit	Rate Rs.
32.1	Supplying following sizes ISI marked FRLS PVC insulated copper conductor, single core wire in company pack coils.		
32.1.1	1.5 sq. mm	Metre	8.00
32.1.2	2.5 sq. mm	Metre	12.00
32.1.3	4.0 sq. mm	Metre	18.00
32.1.4	6.0 sq. mm	Metre	27.00
32.1.5	10.0 sq. mm	Metre	49.00
32.2	Providing following size ISI marked FRLS PVC insulated , PVC sheathed, flexible copper conductor wire.		
32.2.1	0.5 sq. mm two core	Metre	9.00
32.2.2	1.0 sq. mm two core	Metre	14.00
32.2.3	1.0 sq. mm three core	Metre	19.00
32.2.4	1.5 sq. mm three core	Metre	30.00
32.2.5	2.5 sq. mm three core	Metre	48.00
32.2.6	4.0 sq. mm three core	Metre	72.00
32.3	Providing following size ISI marked FR PVC insulated , PVC sheathed, 3 core submersible copper conductor wire and IS : 694 (2010).		
32.3.1	1.5 sq. mm	Metre	29.00
32.3.2	2.5 sq. mm	Metre	47.00
32.3.3	4.0 sq. mm	Metre	67.00
32.4	Supplying ISI marked following pair 0.5 mm FR PVC insulated PVC seathed copper conductor, telephone cable in company pack coils.		
32.4.1	1 Pair	Metre	3.00
32.4.2	2 Pair	Metre	5.00
32.4.3	4 Pair	Metre	9.00
32.5	Supplying following grade co-axial TV cable FR PVC insulated , shielded with fine tinned copper braid and protected with PVC sheath cable in company pack coils.		
32.5.1	RG-6 grade	Metre	10.00
32.5.2	RG-11 grade	Metre	29.00

Code No.	Description	Unit	Rate Rs.
32.6	Supplying following UTP 4 pair Cat 6 LAN cable cable in company pack coils.	Metre	15.00
32.7	Supplying following sizes FRLS PVC insulated , PVC sheathed, steel armoured, aluminium conductor power cable of 1.1 KV grade IS: 1554 (1988, Part 1) / IS: 7098 (1988, Part 1).		
32.7.1	2 x 4 sq. mm	Metre	34.00
32.7.2	2 x 6 sq. mm	Metre	40.00
32.7.3	2 x 10 sq. mm	Metre	49.00
32.7.4	2 x 16 sq. mm	Metre	56.00
32.7.5	2 x 25 sq. mm	Metre	60.00
32.7.6	2 x 35 sq. mm	Metre	73.00
32.7.7	3 x 10 sq. mm	Metre	58.00
32.7.8	3 x 16 sq. mm	Metre	61.00
32.7.9	3 x 25 sq. mm	Metre	82.00
32.7.10	3 x 35 sq. mm	Metre	98.00
32.7.11	3.5 x 25 sq. mm.	Metre	70.00
32.7.12	3.5 x 35 sq. mm.	Metre	78.00
32.7.13	3.5 x 50 sq. mm.	Metre	105.00
32.7.14	3.5 x 70 sq. mm.	Metre	112.00
32.7.15	3.5 x 95 sq. mm.	Metre	121.00
32.7.16	3.5 x 120 sq. mm.	Metre	154.00
32.7.17	3.5 x 150 sq. mm.	Metre	210.00
32.7.18	3.5 x 185 sq. mm.	Metre	263.00
32.7.19	3.5 x 240 sq. mm.	Metre	331.00
32.7.20	3.5 x 300 sq. mm.	Metre	405.00
32.7.21	3.5 x 400 sq. mm.	Metre	498.00
32.7.22	4 x 10 sq. mm.	Metre	65.00
32.7.23	4 x 16 sq. mm.	Metre	73.00
32.7.24	4 x 25 sq. mm.	Metre	100.00
32.8	Supplying following sizes FRLS PVC insulated , PVC sheathed, steel armoured, copper conductor control cable of 1.1 KV grade		
32.8.1	2 x 1.5 sq. mm	Metre	34.00
32.8.2	4 x 1.5 sq. mm	Metre	60.00
32.8.3	6 x 1.5 sq. mm	Metre	79.00
32.9	Supplying of following sizes FRLS PVC conduit		
32.9.1	20 mm	Metre	8.00
32.9.2	25 mm	Metre	14.00
32.10	Supplying of following sizes FRLS PVC conduit accessories		
32.10.1	20 mm bend	Each	6.00
32.10.2	25 mm bend	Each	6.00
32.10.3	20 mm couplers	Each	2.00

Code No.	Description	Unit	Rate Rs.
32.10.4	25 mm couplers	Each	3.00
32.11	Supplying of following sizes PVC casing caping		
32.11.1	20x12 mm	Metre	11.00
32.11.2	25x16 mm	Metre	11.00
32.11.3	32x16 mm	Metre	20.00
32.12	Supplying following Modular base & cover plate in sealed company packing.		
32.12.1	1 Module	Each	26.00
32.12.2	2 Module	Each	26.00
32.12.3	3 Module	Each	33.00
32.12.4	4 Module	Each	39.00
32.12.5	6 Module	Each	51.00
32.12.6	8 Module	Each	64.00
32.12.7	12 Module	Each	99.00
32.12.8	16 Module	Each	133.00
32.13	Supplying following modular switch, socket, other accessories in sealed company packing.		
32.13.1	5/6 amps one way switch	Each	37.00
32.13.2	5/6 amps two way switch	Each	43.00
32.13.3	Bell push	Each	48.00
32.13.4	15/16 amp switch	Each	58.00
32.13.5	3 pin 5/6 amp socket outlet	Each	52.00
32.13.6	6 pin 15/16 amp socket outlet	Each	79.00
32.13.7	6 pin 20 amp socket outlet	Each	94.00
32.13.8	Fan regulator (two module size) electronic stepped type moving all rounds	Each	140.00
32.13.9	Telephone socket outlet	Each	38.00
32.13.10	T.V. antenna socket outlet	Each	42.00
32.13.11	Computer Outlet Jack	Each	161.00
32.13.12	25/32 amp A.C. Starter switch	Each	147.00
32.13.13	SP MCB 25 amp	Each	48.00
32.13.14	Blanking plate	Each	9.00
32.13.15	Key Tag Switch 20 amp with face and grid plate	Each	174.00
32.13.16	Key Tag Switch 32 amp with face and grid plate	Each	309.00
32.13.17	Key Holder/Tag for key tag	Each	30.00
32.13.18	USB charger socket 850 mA	Each	220.00
32.13.19	USB charger socket 2.1 A	Each	264.00
32.14	Supplying following accessories in delux quality in company packing.		
32.14.1	Plug Top (Deluxe type) 3 pin 5/6 Amps (For light plug).	Each	40.00
32.14.2	Plug Top (Deluxe type) 3 pin 16 Amps (For power plug).	Each	57.00
32.14.3	Plug Top (Deluxe type) 3 pin 25 Amps (For power plug).	Each	77.00
32.14.4	Ceiling rose 3 pin 5 amp	Each	12.00
32.14.5	Pendent holder	Each	13.00

Code No.	Description	Unit	Rate Rs.
32.14.6	Batten/ angle holder	Each	13.00
32.14.7	Call bell (Dindong), AC/DC, single phase	Each	106.00
32.14.8	Call bell/ buzzer, AC/DC, single phase	Each	33.00
32.14.9	Call bell with cordless bell push (bell operated on 230V AC and bell push with battery cell)	Each	167.00
32.15	Supplying following ISI marked piano type switch, socket and other accessories		
32.15.1	5/6 amps one way switch	Each	9.00
32.15.2	5/6 amps two way switch	Each	16.00
32.15.3	Bell push	Each	16.00
32.15.4	15/16 amps switch	Each	41.00
32.15.5	3 pin 5/6 amp socket outlet	Each	15.00
32.15.6	6 pin 15/16 amp socket outlet	Each	43.00
32.15.7	Plug Top 3 pin 5/6 Amps (For light plug).	Each	23.00
32.15.8	Plug Top 3 pin 16 Amps (For power plug).	Each	37.00
32.15.9	Telephone socket outlet	Each	30.00
32.15.10	TV antenna socket outlet	Each	17.00
32.15.11	Fan regulator Electronic, step type moving all round	Each	123.00
32.15.12	Ceiling rose 3 pin 5 amps	Each	12.00
32.15.13	Pendent holder	Each	13.00
32.15.14	Batten/ angle holder	Each	10.00
32.15.15	Phenolic laminated sheet	sqcm	0.08
32.16	Supplying metal box of following sizes (nominal size) including painting.		
32.16.1	75 mm X 75 mm X 60 mm deep	Each	15.00
32.16.2	100 mm X 100 mm X 60 mm deep	Each	23.00
32.16.3	150 mm X 75 mm X 60 mm deep	Each	25.00
32.16.4	150 mm X 150 mm X 60 mm deep	Each	36.00
32.16.5	180 mm X 100 mm X 60 mm deep	Each	34.00
32.16.6	200 mm X 125 mm X 60 mm deep	Each	43.00
32.16.7	200 mm X 150 mm X 60 mm deep	Each	53.00
32.16.8	200 mm X 250 mm X 60 mm deep	Each	70.00
32.16.9	200 mm X 300 mm X 60 mm deep	Each	68.00
32.16.10	250 mm X 300 mm X 60 mm deep	Each	94.00
32.16.11	325 mm X 300 mm X 60 mm deep	Each	120.00
32.16.12	375 mm X 300 mm X 60 mm deep	Each	134.00
32.17	Supplying of following sizes wooden switch box made of wooden plank side wall and base		
32.17.1	100mmX100mm	Each	6.00
32.17.2	150mmX75mm	Each	8.00
32.17.3	150mmX150mm	Each	10.00
32.17.4	180mmX100mm	Each	12.00

Code No.	Description	Unit	Rate Rs.
32.17.5	200mmX150mm	Each	16.00
32.17.6	250mmX200mm	Each	19.00
32.17.7	300mmX350mm	Each	29.00
32.17.8	300mmX400mm	Each	34.00
32.18	Supplying of following sizes PVC switch box suitable for modular switches		
32.18.1	94 mm X 94 mm (1/2 Module)	Each	34.00
32.18.2	118 mm X 94 mm (3 Module)	Each	36.00
32.18.3	150 mm X 94 mm (4 Module)	Each	38.00
32.18.4	205 mm X 94 mm (6 Module)	Each	51.00
32.19	Supplying following size/ modules, GI box for modular switches		
32.19.1	75mmX75mm (1/2 Module)	Each	25.00
32.19.2	100mmX75mm (3 Module)	Each	29.00
32.19.3	125mmX75mm (4 Module)	Each	32.00
32.19.4	200mmX75mm (6 Module)	Each	48.00
32.19.5	125mmX125mm (8 Module)	Each	60.00
32.19.6	200mmX150mm (12 Module)	Each	78.00
32.19.7	16 Module	Each	107.00
32.20	Supplying of following sizes ceiling fan		
32.20.1	600 mm sweep	Each	1110.00
32.20.2	1050 mm sweep	Each	1187.00
32.20.3	1200 mm sweep	Each	1217.00
32.20.4	1400 mm sweep	Each	1295.00
32.20.5	900 mm sweep (Decorative Type)	Each	1479.00
32.20.6	1200 mm sweep (Decorative Type)	Each	1610.00
32.20.7	1200 mm Sweep (BLDC Motor)	Each	2069.00
32.21	Supplying of following sizes 1400 rpm heavy duty (continuous running) exhaust fan		
32.21.1	300 mm sweep	Each	1821.00
32.21.2	380 mm sweep	Each	2229.00
32.21.3	450 mm sweep	Each	3093.00
32.22	Supply of 250/ 300 mm sweep Exhaust fan (Medium Duty)	Each	897.00
32.23	Supplying of following sizes fancy exhaust fan having built in lovers		
32.23.1	225 mm sweep	Each	791.00
32.23.2	300 mm sweep	Each	880.00
32.24	Supplying of resistance type FAN Regulator	Each	69.00
32.25	Supplying of wall/ cabin fan		
32.25.1	300 mm sweep	Each	1054.00
32.25.2	400mm sweep	Each	1773.00
32.25.3	400 mm sweep (Inverter Type: with builtin battery backup)	Each	2074.00
32.26	Supplying of following type fluorescent fitting (luminaries) complete with electronic ballast/ copper ballast glow type starter but without fluorescent		

Code No.	Description	Unit	Rate Rs.
	lamp		
32.26.1	4' x 40 W single patti type	Each	169.00
32.27	Supplying of following 230/250 volts fluorescent lamp (tube)		
32.27.1	4' x 36/40 watt	Each	35.00
32.28	Supplying of good quality powder coated MS frame for installation of out door unit of split type Air Conditioner with atleast 6 nos steel fastners.	Set	300.00
32.29	Supplying, connecting and fixing 15mm dia PVC flexible drain pipe (reinforced with nylon threads) in drain outlet of split type air conditioners etc complete as per specification	Metre	5.00
32.30	Supplying of following LED lamps with inbuilt electronic driver heat sink for conventional holder		
32.30.1	3 Watt	Each	56.00
32.30.2	5 Watt	Each	77.00
32.30.3	7 Watt	Each	89.00
32.30.4	9 Watt	Each	106.00
32.30.5	12 Watt	Each	158.00
32.30.6	15 Watt	Each	180.00
32.30.7	9 Watt (Inverter Type: with builtin battery backup)	Each	224.00
32.30.8	12 Watt (Inverter Type: with builtin battery backup)	Each	450.00
32.31	Supplying of following 230/250 volts metal halide lamp		
32.31.1	70 watt (T)	Each	587.00
32.31.2	150 watt (T)	Each	625.00
32.31.3	250 watt (T)	Each	719.00
32.31.4	400 watt (BT)	Each	757.00
32.31.5	70 Watt (E)	Each	587.00
32.31.6	150 Watt (E)	Each	662.00
32.31.7	250 Watt (E)	Each	719.00
32.31.8	400 watt (E)	Each	757.00
32.31.9	70 Watt double ended	Each	398.00
32.31.10	150 watt double ended	Each	417.00
32.32	Supplying of following 230/250 volts HPSV lamp tubular/elliptical		
32.32.1	70 watt (E)	Each	282.00
32.32.2	150 watt (E)	Each	392.00
32.32.3	250 watt (E)	Each	431.00
32.32.4	400 watt (E)	Each	509.00
32.32.5	70 Watt (T)	Each	314.00
32.32.6	150 Watt (T)	Each	407.00
32.32.7	250 Watt (T)	Each	455.00
32.32.8	400 Watt (T)	Each	533.00
32.32.9	70 Watt (T) plus	Each	377.00
32.32.10	150 Watt (T) plus	Each	533.00

Code No.	Description	Unit	Rate Rs.
32.32.11	250 Watt (T) plus	Each	647.00
32.32.12	400 Watt (T) plus	Each	686.00
32.33	Supplying of approved make following 230/250 volts electronic ballast		
32.33.1	For 36/40 watt T8 flu. Fitting	Each	129.00
32.33.2	For 28 watt T5 flu. Fitting	Each	280.00
32.33.3	For 26 watt CFL Fitting	Each	367.00
32.33.4	For 36 watt CFL Fitting	Each	367.00
32.33.5	For 70 watt HPSV/ Metal halide fitting	Each	503.00
32.33.6	For 150 watt HPSV/ Metal halide fitting	Each	813.00
32.33.7	For 250 watt HPSV/ Metal halide fitting	Each	1008.00
32.33.8	For 400 watt HPSV/ Metal halide fitting	Each	1447.00
32.34	Supplying of approved make following 230/250 volts polyster filled copper wound ballast		
32.34.1	For 36/40 watt T8 flu. Fitting	Each	129.00
32.34.2	For 70 watt HPSV/ Metal halide fitting	Each	621.00
32.34.3	For 150 watt HPSV/ Metal halide fitting	Each	930.00
32.34.4	For 250 watt HPSV/ Metal halide fitting	Each	1429.00
32.34.5	For 400 watt HPSV/ Metal halide fitting	Each	2058.00
32.35	Supplying of glow type stater suitable for 36/40 watt	Each	11.00
32.36	Supplying of following 230/250 volts Ignitors for 70-400 watt	Each	147.00
32.37	Supplying of following 230/250 volts capacitors for ceiling fans/ exhaust fan		
32.37.1	2.0 MFD	Each	20.00
32.37.2	2.5 MFD	Each	22.00
32.37.3	3.15 MFD	Each	25.00
32.37.4	4 MFD	Each	28.00
32.38	Supplying of following 230/250 volts capacitors for single phase motor		
32.38.1	6 MFD	Each	33.00
32.38.2	8 MFD	Each	38.00
32.38.3	10 MFD	Each	43.00
32.38.4	12 MFD	Each	50.00
32.38.5	15 MFD	Each	51.00
32.38.6	20 MFD	Each	74.00
32.38.7	25 MFD	Each	92.00
32.38.8	30 MFD	Each	102.00
32.39	Supplying of following 400 volts capacitors for Air conditioners		
32.39.1	36 MFD	Each	273.00
32.39.2	45 MFD	Each	295.00
32.39.3	50 MFD	Each	237.00
32.39.4	60 MFD	Each	346.00
32.40	Providing following rating and breaking capacity MCCB		
32.40.1	3 pole MCCB, 25-63A, Fixed Thermal Release, 10KA	Each	1086.00

Code No.	Description	Unit	Rate Rs.
32.40.2	3 pole MCCB, 80-100A, Fixed Thermal Release, 10KA	Each	1185.00
32.40.3	3 pole MCCB, 25-100A, Adjustable Thermal Release, 18KA	Each	1807.00
32.40.4	3 pole MCCB, 100A, Adjustable Thermal - Magnetic Release, 25KA	Each	2835.00
32.40.5	3 pole MCCB, 125A, Adjustable Thermal - Magnetic Release, 25KA	Each	4462.00
32.40.6	3 pole MCCB, 160A, Adjustable Thermal - Magnetic Release, 25KA	Each	5838.00
32.40.7	3 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 25KA	Each	7195.00
32.40.8	3 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 25KA	Each	7268.00
32.40.9	3 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 35KA	Each	8892.00
32.40.10	3 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 35KA	Each	9842.00
32.40.11	3 pole MCCB, 320A, Adjustable Thermal - Magnetic Release, 35KA	Each	10600.00
32.40.12	3 pole MCCB, 400A, Adjustable Thermal - Magnetic Release, 35KA	Each	10770.00
32.40.13	3 pole MCCB, 500A, Adjustable Thermal - Magnetic Release, 35KA	Each	13109.00
32.40.14	3 pole MCCB, 630A, Adjustable Thermal - Magnetic Release, 35KA	Each	14701.00
32.40.15	3 pole MCCB, 400A, Adjustable Thermal - Magnetic Release, 50KA	Each	12302.00
32.40.16	3 pole MCCB, 500A, Adjustable Thermal - Magnetic Release, 50KA	Each	14220.00
32.40.17	3 pole MCCB, 630A, Adjustable Thermal - Magnetic Release, 50KA	Each	15368.00
32.40.18	3 pole MCCB, 250A, Adjustable Microprocessor Release, 35KA	Each	11496.00
32.40.19	3 pole MCCB, 400A, Adjustable Microprocessor Release, 35KA	Each	13621.00
32.40.20	3 pole MCCB, 630A, Adjustable Microprocessor Release, 35KA	Each	14847.00
32.40.21	3 pole MCCB, 400A, Adjustable Microprocessor Release, 50KA	Each	14969.00
32.40.22	3 pole MCCB, 630A, Adjustable Microprocessor Release, 50KA	Each	16270.00
32.40.23	3 pole MCCB, 800A, Adjustable Microprocessor Release, 50KA	Each	26157.00
32.40.24	4 pole MCCB, 100A, Adjustable Thermal - Magnetic Release, 35KA	Each	5234.00
32.40.25	4 pole MCCB, 125A, Adjustable Thermal - Magnetic Release, 35KA	Each	6127.00
32.40.26	4 pole MCCB, 160A, Adjustable Thermal - Magnetic Release, 35KA	Each	7463.00
32.40.27	4 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 35KA	Each	9269.00
32.40.28	4 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 35KA	Each	11109.00
32.40.29	4 pole MCCB, 320A, Adjustable Thermal - Magnetic Release, 35KA	Each	14625.00
32.40.30	4 pole MCCB, 100A, Adjustable Thermal - Magnetic Release, 50KA	Each	6940.00
32.40.31	4 pole MCCB, 125A, Adjustable Thermal - Magnetic Release, 50KA	Each	8542.00
32.40.32	4 pole MCCB, 160A, Adjustable Thermal - Magnetic Release, 50KA	Each	9725.00
32.40.33	4 pole MCCB, 200A, Adjustable Thermal - Magnetic Release, 50KA	Each	13626.00
32.40.34	4 pole MCCB, 250A, Adjustable Thermal - Magnetic Release, 50KA	Each	14244.00
32.40.35	4 pole MCCB, 320A, Adjustable Thermal - Magnetic Release, 50KA	Each	16814.00
32.40.36	4 pole MCCB, 400A, Adjustable Thermal - Magnetic Release, 50KA	Each	15606.00
32.40.37	4 pole MCCB, 500A, Adjustable Thermal - Magnetic Release, 50KA	Each	18410.00
32.40.38	4 pole MCCB, 630A, Adjustable Thermal - Magnetic Release, 50KA	Each	19703.00
32.40.39	4 pole MCCB, 100A, Adjustable Microprocessor Release, 35KA	Each	11112.00
32.40.40	4 pole MCCB, 125A, Adjustable Microprocessor Release, 35KA	Each	12198.00
32.40.41	4 pole MCCB, 160A, Adjustable Microprocessor Release, 35KA	Each	13263.00
32.40.42	4 pole MCCB, 200A, Adjustable Microprocessor Release, 35KA	Each	14335.00

Code No.	Description	Unit	Rate Rs.
32.40.43	4 pole MCCB, 250A, Adjustable Microprocessor Release, 35KA	Each	15794.00
32.40.44	4 pole MCCB, 320A, Adjustable Microprocessor Release, 35KA	Each	18557.00
32.40.45	4 pole MCCB, 100A, Adjustable Microprocessor Release, 50KA	Each	11916.00
32.40.46	4 pole MCCB, 125A, Adjustable Microprocessor Release, 50KA	Each	12666.00
32.40.47	4 pole MCCB, 160A, Adjustable Microprocessor Release, 50KA	Each	14459.00
32.40.48	4 pole MCCB, 200A, Adjustable Microprocessor Release, 50KA	Each	15555.00
32.40.49	4 pole MCCB, 250A, Adjustable Microprocessor Release, 50KA	Each	17309.00
32.40.50	4 pole MCCB, 320A, Adjustable Microprocessor Release, 50KA	Each	19173.00
32.40.51	4 pole MCCB, 400A, Adjustable Microprocessor Release, 50KA	Each	20637.00
32.40.52	4 pole MCCB, 630A, Adjustable Microprocessor Release, 50KA	Each	22478.00
32.41	Supplying following way, 240 volts SP&N MCB distribution board of sheet steel phosphatized and powder painted complete with tinned copper busbar, neutral busbar, earth bar, din bar, detachable gland plate (But without MCB)		
32.41.1	4 way, Single door	Each	341.00
32.41.2	8 way, Single door	Each	429.00
32.41.3	12 way, Single door	Each	509.00
32.41.4	16 way, Single door	Each	630.00
32.41.5	4 way, Double door	Each	496.00
32.41.6	8 way, Double door	Each	618.00
32.41.7	12 way, Double door	Each	746.00
32.41.8	16 way, Double door	Each	924.00
32.42	Supplying horizontal type following way, 415 volts, TPN MCB distribution board of sheet steel phosphatized and powder painted, complete with tinned copper busbar, neutral busbar, earth bar, din bar, detachable gland plate (But without MCB)		
32.42.1	4 way Single door	Each	898.00
32.42.2	6 way Single door	Each	1104.00
32.42.3	8 way Single door	Each	1398.00
32.42.4	4 way Double door	Each	1182.00
32.42.5	6 way Double door	Each	1468.00
32.42.6	8 way Double door	Each	1816.00
32.43	Supplying following SP MCB, 240 volts		
32.43.1	6 amps to 32 amps 'B' curve	Each	103.00
32.43.2	40 amps 'B' curve	Each	234.00
32.43.3	0.5 amps to 5 amps 'C' curve	Each	178.00
32.43.4	6 amps to 32 amps 'C' curve	Each	107.00
32.43.5	40 amps 'C' curve	Each	242.00
32.44	Supplying following DP MCB, 240 volts		
32.44.1	0.5 amps to 5 amps 'C' curve	Each	422.00
32.44.2	6 amps to 32 amps 'C' curve	Each	298.00

Code No.	Description	Unit	Rate Rs.
32.44.3	40 amps 'C' curve	Each	536.00
32.44.4	50 amps 'C' curve	Each	490.00
32.44.5	63 amps 'C' curve	Each	490.00
32.44.6	0.5 amps to 5 amps 'D' curve	Each	411.00
32.44.7	6 amps to 32 amps 'D' curve	Each	311.00
32.44.8	40 amps 'D' curve	Each	490.00
32.44.9	50 amps 'D' curve	Each	507.00
32.44.10	63 amps 'D' curve	Each	507.00
32.45	Supplying following TP MCB, 440 volts		
32.45.1	0.5 amps to 5 amps 'C' curve	Each	649.00
32.45.2	6 amps to 32 amps 'C' curve	Each	478.00
32.45.3	40 amps 'C' curve	Each	751.00
32.45.4	50 amps 'C' curve	Each	759.00
32.45.5	63 amps 'C' curve	Each	759.00
32.45.6	0.5 amps to 5 amps 'D' curve	Each	656.00
32.45.7	6 amps to 32 amps 'D' curve	Each	501.00
32.45.8	40 amps 'D' curve	Each	804.00
32.45.9	50 amps 'D' curve	Each	802.00
32.45.10	63 amps 'D' curve	Each	802.00
32.46	Supplying following TP&N MCB, 440 volts		
32.46.1	0.5 amps to 5 amps 'C' curve	Each	821.00
32.46.2	6 amps to 32 amps 'C' curve	Each	618.00
32.46.3	40 amps 'C' curve	Each	971.00
32.46.4	50 amps 'C' curve	Each	1003.00
32.46.5	63 amps 'C' curve	Each	1003.00
32.46.6	0.5 amps to 5 amps 'D' curve	Each	891.00
32.46.7	6 amps to 32 amps 'D' curve	Each	742.00
32.46.8	40 amps 'D' curve	Each	1044.00
32.46.9	50 amps 'D' curve	Each	1017.00
32.46.10	63 amps 'D' curve	Each	978.00
32.47	Supplying following rating, 240 volts TWO POLE ISOLATOR		
32.47.1	40 amps	Each	153.00
32.47.2	40 amps	Each	181.00
32.47.3	63 amps	Each	222.00
32.48	Supplying following rating, 415 volts, FOUR POLES, ISOLATOR		
32.48.1	40 amps	Each	366.00
32.48.2	63 amps	Each	434.00
32.48.3	100 amps	Each	490.00
32.49	Supplying following rating, DP, 240 volts, RCCB sensitivity up to 300 milliamperes		
32.49.1	25 amps	Each	1150.00

Code No.	Description	Unit	Rate Rs.
32.49.2	40 amps	Each	1333.00
32.49.3	63 amps	Each	1541.00
32.50	Supplying following rating, FP, 415 volts, RCCB sensitivity up to 300 milliamperes		
32.50.1	25 amps	Each	1541.00
32.50.2	40 amps	Each	1556.00
32.50.3	63 amps	Each	1736.00
32.51	Supplying metal clad busbar chamber made of 1.6 mm thick CRCA sheet with 4 strip aluminium alloy or wrought aluminium busbars of following capacity and length, complete with all accessories		
32.51.1	100 amps x 300mm long	Each	707.00
32.51.2	100 amps x 450mm long	Each	964.00
32.51.3	100 amps x 600mm long	Each	1221.00
32.51.4	200 amps x 300mm long	Each	851.00
32.51.5	200 amps x 450mm long	Each	1165.00
32.51.6	200 amps x 600mm long	Each	1477.00
32.51.7	200 amps x 900mm long	Each	2104.00
32.51.8	300 amps x 450mm long	Each	1527.00
32.51.9	300 amps x 600mm long	Each	2033.00
32.51.10	300 amps x 900mm long	Each	2876.00
32.51.11	300 amps x 1200mm long	Each	4069.00
32.51.12	400 amps x 600mm long	Each	2185.00
32.51.13	400 amps x 900mm long	Each	3268.00
32.51.14	400 amps x 1200mm long	Each	4345.00
32.51.15	400 amps x 1500mm long	Each	3048.00
32.51.16	500 amps x 600mm long	Each	2955.00
32.51.17	500 amps x 900mm long	Each	4383.00
32.51.18	500 amps x 1200mm long	Each	5719.00
32.51.19	500 amps x 1500mm long	Each	7054.00
32.52	Supplying metal clad busbar chamber made of 1.6 mm thick CRCA sheet with 4 strip copper busbars of following capacity and length, complete with all accessories		
32.52.1	100 amps x 300mm long	Each	1010.00
32.52.2	100 amps x 450mm long	Each	1419.00
32.52.3	100 amps x 600mm long	Each	1827.00
32.52.4	200 amps x 300mm long	Each	1553.00
32.52.5	200 amps x 450mm long	Each	2217.00
32.52.6	200 amps x 600mm long	Each	2882.00
32.52.7	200 amps x 900mm long	Each	4210.00
32.52.8	300 amps x 450mm long	Each	3578.00
32.52.9	300 amps x 600mm long	Each	4717.00

Code No.	Description	Unit	Rate Rs.
32.52.10	300 amps x 900mm long	Each	6921.00
32.52.11	300 amps x 1200mm long	Each	9126.00
32.52.12	400 amps x 600mm long	Each	5522.00
32.52.13	400 amps x 900mm long	Each	8129.00
32.52.14	400 amps x 1200mm long	Each	10736.00
32.52.15	400 amps x 1500mm long	Each	13342.00
32.52.16	500 amps x 600mm long	Each	6633.00
32.52.17	500 amps x 900mm long	Each	9761.00
32.52.18	500 amps x 1200mm long	Each	12890.00
32.52.19	500 amps x 1500mm long	Each	16018.00
32.53	Supplying following size aluminium strip of bus bar		
32.53.1	20x5mm (100 amps)	Metre	205.00
32.53.2	30x5mm (200 amps)	Metre	205.00
32.54	Providing of metal clad, TP&N switch fuse unit (re-wirable), 415/500 volts, with porcelain re-wireable fuses as per specification.		
32.54.1	32 amps	Each	609.00
32.54.2	63 amps	Each	1379.00
32.54.3	100 amps	Each	2489.00
32.54.4	200 amps	Each	3820.00
32.55	Supplying metal clad, 4 pole, on load change over switch unit (with sheet steel enclosure), 415/500 volts		
32.55.1	100 amps	Each	4876.00
32.55.2	200 amps	Each	9174.00
32.56	Supplying 2 pole, 230/250 volts following rating power contactor		
32.56.1	16 amps	Each	281.00
32.56.2	25 amps	Each	366.00
32.56.3	40 amps	Each	479.00
32.57	Supplying Auxiliary contact block 1 NO + 1 NC	Each	111.00
32.58	Supplying single phase preventer	Each	337.00
32.59	Supplying Astronomical Timer switch (timer) with year programmed	Each	2653.00
32.60	Supplying penal mounting 230 volt LED type indicating lamp	Each	58.00
32.61	Supplying PVC water tight terminal box with detachable gland plate in bottom, hinged front openable cover, 1 Nos 4way connector and 1 No SPMCB inside the box with 2 Nos clamp		
32.61.1	250x200x125 mm for single phase	Each	401.00
32.61.2	300x200x125 mm for 3 phase	Each	501.00
32.62	Supplying of brass compression gland		
32.62.1	16 mm	Each	21.00
32.62.2	19 mm	Each	25.00
32.62.3	22 mm	Each	29.00
32.62.4	25 mm	Each	33.00

Code No.	Description	Unit	Rate Rs.
32.62.5	28 mm	Each	57.00
32.62.6	32 mm	Each	66.00
32.62.7	35 mm	Each	84.00
32.62.8	38 mm	Each	104.00
32.62.9	45 mm	Each	127.00
32.62.10	50 mm	Each	163.00
32.62.11	57 mm	Each	213.00
32.62.12	63 mm	Each	252.00
32.62.13	70 mm	Each	303.00
32.63	Supplying of aluminium lugs		
32.63.1	Aluminium lugs for 4 sq. mm cable	Each	1.00
32.63.2	Aluminium lugs for 6 sq. mm cable	Each	1.00
32.63.3	Aluminium lugs for 10 sq. mm cable	Each	1.00
32.63.4	Aluminium lugs for 16 sq. mm cable	Each	2.00
32.63.5	Aluminium lugs for 25 sq. mm cable	Each	2.00
32.63.6	Aluminium lugs for 35 sq. mm cable	Each	3.00
32.63.7	Aluminium lugs for 50 sq. mm cable	Each	3.00
32.63.8	Aluminium lugs for 70 sq. mm cable	Each	6.00
32.63.9	Aluminium lugs for 95 sq. mm cable	Each	7.00
32.63.10	Aluminium lugs for 120 sq. mm cable	Each	9.00
32.63.11	Aluminium lugs for 150 sq. mm cable	Each	13.00
32.63.12	Aluminium lugs for 185 sq. mm cable	Each	16.00
32.63.13	Aluminium lugs for 225 sq. mm cable	Each	23.00
32.63.14	Aluminium lugs for 240 sq. mm cable	Each	26.00
32.63.15	Aluminium lugs for 300 sq. mm cable	Each	37.00
32.63.16	Aluminium lugs for 400 sq. mm cable	Each	54.00
32.64	Supplying of copper lugs		
32.64.1	Copper lugs for 4 sq. mm cable	Each	3.00
32.64.2	Copper lugs for 6 sq. mm cable	Each	3.00
32.64.3	Copper lugs for 10 sq. mm cable	Each	4.00
32.64.4	Copper lugs for 16 sq. mm cable	Each	6.00
32.64.5	Copper lugs for 25 sq. mm cable	Each	1.00
32.64.6	Copper lugs for 35 sq. mm cable	Each	14.00
32.64.7	Copper lugs for 50 sq. mm cable	Each	14.00
32.64.8	Copper lugs for 70 sq. mm cable	Each	25.00
32.64.9	Copper lugs for 95 sq. mm cable	Each	34.00
32.64.10	Copper lugs for 120 sq. mm cable	Each	45.00
32.64.11	Copper lugs for 150 sq. mm cable	Each	64.00
32.64.12	Copper lugs for 185 sq. mm cable	Each	94.00
32.64.13	Copper lugs for 240 sq. mm cable	Each	132.00
32.65	Supplying of GI wire	kg	71.00

Code No.	Description	Unit	Rate Rs.
32.66	Supplying of 15 amps aerial fuse complete with porcelain tube	Each	54.00
32.67	Supplying of 30 amps aerial fuse complete with porcelain tube	Each	69.00
32.68	Supplying of following disc/ pin insulator		
32.68.1	11 KV pin insulator with hardware fitting	Set	159.00
32.68.2	11 KV disc insulator with hardware fitting	Set	706.00
32.68.3	33 KV pin insulator with hardware fitting	Set	217.00
32.68.4	33 KV disc insulator with hardware fitting	Set	827.00
32.69	Supplying of following		
32.69.1	16/32 amp DP surface switch with neon	Each	115.00
32.69.2	16 amps porcelain re-wirable Kit-Kat.	Each	37.00
32.69.3	32 amps porcelain re-wirable Kit-Kat.	Each	39.00
32.69.4	63 amps porcelain re-wirable Kit-Kat.	Each	122.00
32.69.5	100 amps porcelain re-wirable Kit-Kat.	Each	231.00
32.69.6	200 amps porcelain re-wirable Kit-Kat.	Each	398.00
32.69.7	300 amps porcelain re-wirable Kit-Kat.	Each	605.00
32.69.8	Round/ hexagonal fan box (125mm dia) depth 75mm (max.)	Each	21.00
32.69.9	Fan hook made of 12mm dia steel bar	Each	14.00
32.69.10	Fan clamp made of 3mm thick MS flat.	Each	26.00
32.70	Supplying of following sizes of down rod of 15/20mm dia M.S. pipe of thickness 2mm.		
32.70.1	45 cm long	Each	15.00
32.70.2	60 cm long	Each	23.00
32.70.3	90 cm long	Each	31.00
32.70.4	120 cm long	Each	41.00
32.70.5	300 cm long	Each	45.00
32.71	Supplying of following sizes Pedestal fan		
32.71.1	400 mm sweep	Each	1927.00
32.71.2	450 mm sweep	Each	2006.00
32.71.3	500 mm sweep	Each	2424.00
32.71.4	400 mm sweep (Inverter Type: with builtin battery backup)	Each	2283.00
32.72	Supplying of following LED (luminaries) panel light in round/ square shape with electronic driver heat sink capacitor.		
32.72.1	3 Watt	Each	224.00
32.72.2	6 Watt	Each	321.00
32.72.3	9 Watt	Each	354.00
32.72.4	12 Watt	Each	405.00
32.72.5	15/16 Watt	Each	482.00
32.72.6	18/20 Watt	Each	643.00
32.73	Supplying of following sleek LED panel down lighters (luminaries) in round/ square shape with electronic driver heat sink capacitor		
32.73.1	24 watt, size 300 x 300mm	Each	1413.00

Code No.	Description	Unit	Rate Rs.
32.73.2	36 watt, size 600 x 600mm	Each	1895.00
32.73.3	45 watt, size 1200 x 300mm	Each	2248.00
32.74	Supplying of following COB LED Spot Light with Electronic Driver Heat sink Capacitor		
32.74.1	6 watt	Each	610.00
32.74.2	9 watt	Each	867.00
32.74.3	20 watt	Each	963.00
32.74.4	30 watt	Each	2248.00
32.74.5	40 watt	Each	2312.00
32.74.6	50 watt	Each	2698.00
32.75	Supplying of following LED tube light with Electronic Driver Heat sink Capacitor		
32.75.1	5 watt {2 feet}	Each	183.00
32.75.2	10 watt {2 feet}	Each	236.00
32.75.3	18/20 watt {4 feet}	Each	260.00
32.75.4	36 watt {4 feet}	Each	530.00
32.75.5	20 watt (Inverter type: with builin battery backup))	Each	554.00
32.76	Supplying of following 230/250 volts LED BOLLARD cool white/warm white {Colour Temperature 3000/4000/5600/6000 K} with electronic driver, heat sink, capacitor		
32.76.1	9 watt	Each	2581.00
32.77	Supplying of following 230/250 volts LED Post Top Lantern (lamp).		
32.77.1	25 Watt	Each	2023.00
32.77.2	40 Watt	Each	2248.00
32.77.3	45 Watt	Each	3597.00
32.77.4	65 Watt	Each	5845.00
32.77.5	70 Watt	Each	7194.00
32.78	Supplying of following LED Spike Light with Electronic Driver Heat sink Capacitor		
32.78.1	9 watt	Each	1171.00
32.79	Supplying of following LED Bulk Head complete with Electronic Driver Heat sink Capacitor		
32.79.1	10 watt	Each	860.00
32.80	Supplying of following 230/250 volts LED street light .		
32.80.1	15 watt	Each	861.00
32.80.2	20 watt	Each	1004.00
32.80.3	25 watt	Each	1148.00
32.80.4	30 watt	Each	1435.00
32.80.5	36 watt	Each	1815.00
32.80.6	45 watt	Each	2116.00
32.80.7	60 watt	Each	2726.00

Code No.	Description	Unit	Rate Rs.
32.80.8	90 watt	Each	3945.00
32.80.9	120 watt	Each	4842.00
32.80.10	135 watt	Each	5666.00
32.80.11	150 watt	Each	6563.00
32.80.12	180 watt	Each	8105.00
32.80.13	210 watt	Each	10041.00
32.80.14	250 watt	Each	11476.00
32.81	Supplying of following 230/250 volts LED Flood light.		
32.81.1	30 watt	Each	1820.00
32.81.2	50 watt	Each	2188.00
32.81.3	60 watt	Each	2582.00
32.81.4	80 watt	Each	3522.00
32.81.5	100watt	Each	4806.00
32.81.6	120 watt	Each	5559.00
32.81.7	150 watt	Each	6563.00
32.81.8	180 watt	Each	8822.00
32.81.9	200 watt	Each	9325.00
32.81.10	250 watt	Each	12193.00
32.81.11	300 watt	Each	12982.00
32.81.12	350 watt	Each	15206.00
32.81.13	400 watt	Each	20083.00
32.81.14	500 watt	Each	27327.00
32.82	Providing of metal clad, SP&N switch fuse unit (re-wirable), 230/250 volts.		
32.82.1	32 amps	Each	349.00
32.82.2	63 amps	Each	1111.00
32.83	Providing of metal clad, TP&N double break fuse switch unit (HRC), 415/500 volts.		
32.83.1	63 amps	Each	3003.00
32.83.2	100 amps	Each	4098.00
32.83.3	200 amps	Each	7027.00
32.83.4	320 amps	Each	7797.00
32.83.5	400 amps	Each	11399.00
32.83.6	500 amps	Each	16068.00
32.83.7	800 amps	Each	19806.00
32.84	Providing of bolted connection type following H.R.C. fuses, with 80 KA breaking capacity as per specification.		
32.84.1	32 amps	Each	26.00
32.84.2	63 amps	Each	44.00
32.84.3	100 amps	Each	99.00
32.84.4	125 amps	Each	99.00
32.84.5	200 amps	Each	137.00

Code No.	Description	Unit	Rate Rs.
32.84.6	300 amps	Each	200.00
32.84.7	400 amps	Each	377.00
32.84.8	500 amps	Each	445.00
32.84.9	600 amps	Each	760.00
32.85	Providing knife (DIN) type following H.R.C. fuses, with 80 KA breaking capacity as per specification.		
32.85.1	32 amps	Each	107.00
32.85.2	63 amps	Each	111.00
32.85.3	100 amps	Each	119.00
32.85.4	125 amps	Each	161.00
32.85.5	200 amps	Each	262.00
32.85.6	300 amps	Each	381.00
32.85.7	400 amps	Each	395.00
32.85.8	500 amps	Each	583.00
32.85.9	600 amps	Each	583.00
32.86	Providing of metal clad, 4 pole, on load change over switch unit (with sheet steel enclosure), 415/500 volts as per specification.		
32.86.1	63 amps	Each	4096.00
32.86.2	315 amps	Each	14320.00
32.86.3	400 amps	Each	20868.00
32.86.4	630 amps	Each	24194.00
32.86.5	800 amps	Each	36080.00
32.87	Providing of metal clad, TP&N motorized change over switch unit, 415/500 volts as per specification.		
32.87.1	125 amps	Each	21266.00
32.87.2	200 amps	Each	23411.00
32.87.3	250 amps	Each	29533.00
32.87.4	320 amps	Each	30061.00
32.87.5	400 amps	Each	37856.00
32.87.6	630 amps	Each	40439.00
32.87.7	800 amps	Each	61916.00
32.88	Providing of metal clad, TP&N 4 pole automatic change over switch unit, 415/500 volts as per specification.		
32.88.1	125 amps	Each	36202.00
32.88.2	160 amps	Each	41069.00
32.88.3	250 amps	Each	52396.00
32.88.4	400 amps	Each	64546.00
32.88.5	630 amps	Each	83161.00
32.88.6	800 amps	Each	95634.00
32.88.7	1000 amps	Each	88564.00
32.89	Providing of 3 pole, 415/500 volts following rating (AC-1 Duty) power		

Code No.	Description	Unit	Rate Rs.
	contactor as per specification.		
32.89.1	25 amps	Each	399.00
32.89.2	40 amps	Each	750.00
32.89.3	60 amps	Each	2713.00
32.89.4	100 amps	Each	4669.00
32.89.5	200 amps	Each	9178.00
32.89.6	315 amps	Each	15591.00
32.89.7	400 amps	Each	22553.00
32.90	Providing of 4 pole, 415/500 volts following rating (AC-1 Duty) power contactor as per specification.		
32.90.1	25 amps	Each	716.00
32.90.2	40 amps	Each	1151.00
32.90.3	60 amps	Each	2904.00
32.90.4	100 amps	Each	6178.00
32.90.5	200 amps	Each	12083.00
32.90.6	315 amps	Each	22809.00
32.90.7	400 amps	Each	29559.00
32.91	Providing of following rating current transformer as per specification.		
32.91.1	50/5 amps	Each	186.00
32.91.2	100/5 amps	Each	186.00
32.91.3	200/5 amps	Each	186.00
32.91.4	315/5 amps	Each	186.00
32.91.5	400/5 amps	Each	218.00
32.91.6	500/5 amps	Each	235.00
32.91.7	800/5 amps	Each	283.00
32.91.8	1000/5 amps	Each	291.00
32.92	Providing of penal mounting following rating analog type ammeter of size 100x100 (NS) as per specification.		
32.92.1	0-50 amps	Each	248.00
32.92.2	0-100 amps	Each	281.00
32.92.3	0-200 amps	Each	281.00
32.92.4	0-500 amps	Each	281.00
32.92.5	0-1000 amps	Each	281.00
32.93	Providing of penal mounting following rating digital type ammeter of size 100x100 (NS) as per specification.		
32.93.1	0-50 amps	Each	664.00
32.93.2	0-100 amps	Each	664.00
32.93.3	0-200 amps	Each	664.00
32.93.4	0-500 amps	Each	664.00
32.93.5	0-1000 amps	Each	664.00
32.94	Providing of penal mounting 0-500 volt voltmeter of size 100x100 (NS) as		

Code No.	Description	Unit	Rate Rs.
	per specification.		
32.94.1	Analog type	Each	250.00
32.94.2	Digital type	Each	586.00
32.95	Providing of penal mounting selector switch.		
32.95.1	For voltmeter	Each	88.00
32.95.2	For ammeter	Each	104.00
32.96	Providing of following Time switch (timer) as per specification.		
32.96.1	Digital type	Each	1522.00
32.96.2	Analoge type	Each	1783.00
32.97	Supplying of INDOOR cable end jointing with heat shrinkable cable jointing kit.		
32.97.1	150 sq. mm	Each	4088.00
32.97.2	185 sq. mm	Each	6163.00
32.97.3	240 sq. mm	Each	6163.00
32.97.4	300 sq. mm	Each	6979.00
32.97.5	400 sq. mm	Each	6979.00
32.98	Supplying of OUTDOOR cable end jointing with heat shrinkable cable jointing kit.		
32.98.1	50 sq. mm	Each	5534.00
32.98.2	70 sq. mm	Each	5976.00
32.98.3	90 sq. mm	Each	7710.00
32.98.4	120 sq. mm	Each	7710.00
32.98.5	150 sq. mm	Each	7710.00
32.98.6	185 sq. mm	Each	9502.00
32.98.7	225 sq. mm	Each	9502.00
32.98.8	240 sq. mm	Each	9502.00
32.98.9	300 sq. mm	Each	12397.00
32.98.10	400 sq. mm	Each	12397.00
32.99	Supplying of STRAIGHT THROUGH cable jointing with heat shrinkable cable jointing kit.		
32.99.1	50 sq. mm	Each	15822.00
32.99.2	70 sq. mm	Each	15822.00
32.99.3	90 sq. mm	Each	20015.00
32.99.4	120 sq. mm	Each	20015.00
32.99.5	150 sq. mm	Each	20015.00
32.99.6	185 sq. mm	Each	27830.00
32.99.7	225 sq. mm	Each	27830.00
32.99.8	240 sq. mm	Each	30676.00
32.99.9	300 sq. mm	Each	31163.00
32.99.10	400 sq. mm	Each	31163.00
32.100	Supplying of centrifugal type mono-block self priming electric pump set		

Code No.	Description	Unit	Rate Rs.
	suitable for single phase, 230 volts AC as per specification.		
32.100.1	0.25 HP single phase	Each	2136.00
32.100.2	0.50 HP single phase	Each	2644.00
32.100.3	1.0 HP single phase	Each	3981.00
32.100.4	2.0 HP single phase	Each	8091.00
32.101	Supplying of centrifugal type mono-block electric pump set for water supply system having following capacity three phase, 415 volts AC induction motor and pump as per specification.		
32.101.1	3 HP, 420 LPM, 20 m head, suction size 65 mm, delivery size 50 mm	Each	9928.00
32.101.2	5 HP, 750 LPM, 20 m head, suction size 80 mm, delivery size 65 mm	Each	13256.00
32.101.3	7.5 HP, 650 LPM, 30 m head, suction size 80 mm, delivery size 65 mm	Each	17519.00
32.102	Supplying of submersible pump set for water supply system with submersible motor as per specification.		
32.102.1	1.0 HP, single phase	Each	12441.00
32.102.2	1.5 HP, single phase	Each	13889.00
32.102.3	2.0 HP, single phase	Each	15773.00
32.102.4	3.0 HP, three phase	Each	18246.00
32.102.5	5.0 HP, three phase	Each	21100.00
32.102.6	6.0 HP, three phase	Each	22528.00
32.102.7	7.5 HP, three phase	Each	27697.00
32.102.8	10 HP, three phase	Each	31697.00
32.102.9	12.5 HP, three phase	Each	37417.00
32.102.10	15 HP, three phase	Each	40414.00
32.103	Supplying of following sizes 'B' class G I pipe as per specification.		
32.103.1	100 mm dia.	Each	610.00
32.103.2	80 mm dia.	Each	94.00
32.103.3	65 mm dia.	Each	254.00
32.103.4	50 mm dia.	Each	183.00
32.103.5	40 mm dia.	Each	139.00
32.103.6	32 mm dia.	Each	117.00
32.103.7	25 mm dia.	Each	90.00
32.104	Supplying of following dia HDPE pipe PE-80 Grade (8kg/sqcm) as per specification.		
32.104.1	32 mm outer dia	Each	26.00
32.104.2	50 mm outer dia	Each	80.00
32.104.3	63 mm outer dia	Each	141.00
32.105	Supplying of following sizes GM gate valve as per specification.		
32.105.1	100 mm dia.	Each	4154.00
32.105.2	80 mm dia.	Each	1593.00
32.105.3	65 mm dia.	Each	940.00
32.105.4	50 mm dia.	Each	673.00

Code No.	Description	Unit	Rate Rs.
32.105.5	40 mm dia.	Each	389.00
32.105.6	32 mm dia.	Each	337.00
32.105.7	25 mm dia.	Each	292.00
32.106	Supplying of following sizes GM non return valve as per specification.		
32.106.1	100 mm dia.	Each	3589.00
32.106.2	80 mm dia.	Each	2107.00
32.106.3	65 mm dia.	Each	1566.00
32.106.4	50 mm dia.	Each	843.00
32.106.5	40 mm dia.	Each	622.00
32.106.6	32 mm dia.	Each	420.00
32.106.7	25 mm dia.	Each	271.00
32.107	Supply of 10-15 HP 3 phase submersible motor starter cum control	Each	6701.00
32.108	Supply of 5-7.5 HP 3 phase submersible motor starter cum control	Each	3297.00
32.109	Supply of 1-3 HP 1 phase submersible motor starter cum control	Each	3194.00
32.110	Supplying of Pressure pump set suitable for single phase, 230 volts AC supply as per specification.		
32.110.1	0.60 HP single phase	Each	12662.00
32.110.2	0.80 HP single phase	Each	15761.00
32.110.3	1.00 HP single phase	Each	16882.00
32.110.4	1.50 HP single phase	Each	18135.00
32.111	Supply of approved make wall mounting type voltage stabilizer with input volts 160-250, output volts 200-240 volts as per specification.		
32.111.1	4 KVA	Each	3185.00
32.111.2	5 KVA	Each	3640.00
32.112	Supplying of following 440 volts capacitors in WT/ Split / Tower airconditioners at all locations as per specification.		
32.112.1	36 MFD	Each	247.00
32.112.2	45 MFD	Each	269.00
32.112.3	50 MFD	Each	215.00
32.112.4	60 MFD	Each	315.00
32.113	Supplying, installation, testing and commissioning following rating (Sealed Maintenance Free) lead acid battery including connection as per specification.		0.00
32.113.1	42 AH	Each	4412.00
32.114	Supplying of following rating (Sealed Maintenance Free) lead acid battery.		0.00
32.114.1	42 AH	Each	4378.00
32.114.2	60/65 AH	Each	5508.00
32.114.3	100 AH	Each	8481.00
32.114.4	120 AH	Each	10305.00
32.114.5	150 AH	Each	12058.00
32.114.6	200 AH	Each	15921.00

Code No.	Description	Unit	Rate Rs.
32.115	Supplying of following rating lead acid battery (Maintenance Type).		0.00
32.115.1	100 AH	Each	7461.00
32.115.2	120 AH	Each	9372.00
32.115.3	150 AH	Each	12056.00
32.115.4	200 AH	Each	14268.00
32.116	Supply of following type LED Driver for LED Panel/down lights of approved make		0.00
32.116.1	3-6 watt	Each	71.00
32.116.2	9-12 watt	Each	94.00
32.116.3	15 watt	Each	111.00
32.116.4	18/20 watt	Each	128.00
32.116.5	36/40 watt	Each	292.00
32.117	Supply of following type LED Driver for COB lights of approved make.		0.00
32.117.1	6-15 watt	Each	332.00
32.117.2	20 watt	Each	347.00
32.117.3	30 watt	Each	459.00
32.117.4	40 watt	Each	495.00
32.117.5	50 watt	Each	585.00
32.118	Supply of copper piping for split type air conditioners of following dia and approved quality		0.00
32.118.1	5/8 "	Metre	202.00
32.118.2	1/2 "	Metre	88.00
32.118.3	1/4 "	Metre	43.00
32.119	Supply of (for topping up) required quantity of R-22 refrigerant in existing window/ split air conditioners as per manufacturers specification.		0.00
32.119.1	1.5 ton window type AC	Each	122.00
32.119.2	2.0 ton window type AC	Each	128.00
32.119.3	1.5 ton split type AC	Each	145.00
32.119.4	2.0 ton split type AC	Each	161.00
32.120	Supply of (for filling up) required quantity of R-22 refrigerant in existing window/ split air conditioners as per manufacturers specification		0.00
32.120.1	1.5 ton window type AC	Each	405.00
32.120.2	2.0 ton window type AC	Each	450.00
32.120.3	1.5 ton split type AC	Each	450.00
32.120.4	2.0 ton split type AC	Each	495.00
32.121	Supplying of following spares/ accessories in window/ split AC		0.00
32.121.1	Electronic control PCB for WT/AC	Each	857.00
32.121.2	Electronic control PCB for Split/AC	Each	1114.00
32.121.3	Digital Display Unit for WT/Split AC	Each	1370.00
32.121.4	Blower motor for indoor unit of Split AC	Each	1156.00
32.121.5	Fan motor for outdoor unit of Split AC	Each	1328.00

Code No.	Description	Unit	Rate Rs.
32.121.6	Fan motor blade for outdoor unit of Split AC	Each	385.00
32.121.7	Swing motor for WT/ Split AC	Each	257.00
32.121.8	Remote for WT/ split AC	Each	300.00
32.121.9	Dead Nut 1/4"	Each	34.00
32.121.10	Dead Nut 1/2"	Each	43.00
32.121.11	Dead Nut 5/8"	Each	60.00

CHAPTER 33 - Miscellaneous

IMPORTANT INDIAN STANDARDS CODES OF PRACTICE GUIDE

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 732:1989	Code of practice for electrical wiring installations (third revision)	March 2010	
(2)	IS 4648:1968	Guide for electrical layout in residential buildings	August 2012	
(3)	IS 8061:1976	Code of practice for design, installation and maintenance of service lines upto and including 650 V	March 2011	
(4)	IS 8884:1978	Code of practice for the installation of electric bells and call systems	August 2012	
(5)	IS 5578:1984/ IEC 60391(1972)	Guide for marking of insulated conductors (first revision)	March 2011	
(6)	IS 11353:1985/ IEC 60445 (1973)	Guide for uniform system of marking and identification of conductors and apparatus terminals	July 2012	
(7)	IS 13234:1991/ IEC 60909: 1988	Guide for short circuit current calculations in three-phase ac systems (superseding IS 5728)	August 2012	
(8)	IS 7752 (Part 1): 1975	Guide for improvement of power factor in consumer installation: Part 1 Low and medium supply voltages	March 2011	
(9)	IS 3646 (Part 1): 1992	Code of practice for interior illumination: Part 1 General requirements and recommendations for working interiors (first revision)	March 2008	
(10)	IS 3646 (Part 2): 1966	Code of practice for interior illumination: Part 2 Schedule of illumination and glare index	March 2008	
(11)	IS 3646 (Part 3): 1968	Code of practice for interior illumination: Part 3 Calculation of coefficients of utilization by the BZ method	March 2008	
(12)	IS 4347:1967	Code of practice for hospital lighting	May 2010	
(13)	IS 6665:1972	Code of practice for industrial lighting	May 2010	
(14)	IS 2672:1966	Code of practice for library lighting	May 2010	
(15)	IS 10118 (Part 1):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 1 General	March 2011	
(16)	IS 10118 (Part 2):1982	Code of practice for selection, installation and maintenance of Switchgear and controlgear : Part 2 Selection	March 2011	
(17)	IS 10118 (Part 3):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 3 Installation	March 2011	

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(18)	IS 10118 (Part 4):1982	Code of practice for selection, installation and maintenance of switchgear and controlgear : Part 4 Maintenance	March 2011	
(19)	IS 4146:1983	Application guide for voltage transformers (first revision)	September 2011	
(20)	IS 4201:1983	Application guide for current transformers (first revision)	September 2011	
(21)	IS 5547:1983	Application guide for capacitor voltage transformers (first revision)	September 2011	
(22)	IS 2309:1989	Code of practice for protection of buildings and allied structures against lightning (second revision)	March 2010	1
(23)	IS 3043:1987	Code of practice for earthing	March 2011	2
(24)	IS 5216 (Part 1):1982	Recommendations on safety procedures and practices in electrical work: Part 1 General (first revision)	March 2010	
(25)	IS 5216 (Part 2):1982	Recommendations on safety procedures and practices in electrical work: Part 2 Life saving techniques (first revision)	March 2010	

ELECTRIC FANS

CODES OF PRACTICE GUIDE

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 555:1979	Electric table type fans and regulators (third revision)	July 2010	2
(2)	IS 1169:1967	Electric pedestal type fans and regulators (first revision)	Mar 2009	6
(3)	IS 374:1979	Electric ceiling type fans and regulators (third revision)	September 2010	6
(4)	IS 2997:1964	Air circulator type electric fans and regulators	July 2010	8
(5)	IEC: 60665 (1981) IS 2312:1967	Propeller type ac ventilating fans (first revision) Draft Standard issued in wide circulation	July 2010	8
(6)	IS 3588:1987	Electric axial flow fans (first revision)	August 2009	1
(7)	IS 3963:1987	Roof extractor units (first revision)	August 2009	3
(8)	IS 4283:1981	Hot air fans (first revision)	August 2009	3
(9)	IS 6272:1987	Industrial cooling fans (man coolers) (first revision)	August 2009	2
(10)	IS 4894:1987	Centrifugal fans (first revision)	August 2009	3
(11)	IS 11037:1984	Electronic type fan regulators	August 2010	3
(12)	IS 12155:1987	General and safety requirements for fans and regulators for household and similar purposes		

LOW VOLTAGE SWITCH GEAR AND CONTROL GEAR

CODES OF PRACTICE GUIDE

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 4237:1982	General requirements for switchgear and controlgear for voltages not exceeding 1000 volts ac or 1200 volts dc (first revision) [superseded by IS 13947 (Part 1):1993]		
(2)	IS 6875 (Part 1): 1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac & 1200 V dc: Part 1 General requirements [superseded by IS 13947 (Part 5/Section 1)]		
(3)	IS 6875 (Part 2): 1973	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac and 1200 V dc: Part 2 Push-buttons and related control switches [Superseded by IS 13947 (Part 5/Section1)]		
(4)	IS 6875 (Part 3): 1980	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltages upto and including 1000 V ac and 1200 V dc : Part 3 Rotary control switches [superseded by IS 13947 (Part 5/Section 1)]		
(5)	IS 10027:2000	Composite units of air-break switches and rewirable type fuses for voltages not exceeding 650 volt ac - Specification (first revision)	March 2010	
(6)	IS 4064 (Part 1): 1978	Air-break switches, air break disconnectors, air-break switch disconnectors and fuse-combination units for voltages not exceeding 1000 V ac or 1200 V dc: Part 1 General requirements (revised) [superseded by IS 13947 (Part 3): 1993]		
(7)	IS 2675:1983	Enclosed Distribution Fuse Boards and Cut Outs for voltages not exceeding 1000 V A.C. or 1200 V D.C.	March 2011	
(8)	IS 8828:1996	Circuit-breakers for over current protection for household and similar installations (second revision)		
(9)	IS 13032:1991	Miniature circuit breaker boards for voltage upto and including 1 000 Volt ac	March 2011	1
(10)	IS 12640 (Part 1): 2008	Residual current operated circuit-breakers for household and similar uses : Part 1 circuit-breakers without integral over current protection (RCCBs) (First Revision)		
(11)	IS 12640 (Part 2): 2008	Residual current operated circuit-breakers for household and similar uses: Part 2 circuit breakers with integral over current protection (RCBOs) (First Revision)		
(12)	IS 2959:1985	Contactors for voltages not exceeding 1000 V ac or 1200 V dc (first revision) [superseded by IS 13947 (Part 4/Section 1)]		
(13)	IS 12021:1987	Specification for control transformers for switchgear and controlgear for voltages not exceeding 1000 Volt AC	March 2010	2

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(14)	IS 5039:1983	Distribution pillars for voltages not exceeding 1000 volts (first revision)	March 2011	2
(15)	IS 8623 (Part 1): 1993/ IEC 60439-1 (1985)	Specification for low voltage switchgear and controlgear assemblies: Part 1 Requirements for type-tested and partially type tested assemblies (first revision).	March 2008	2
(16)	IS 8623 (Part 2):1993/ IEC 60439-2 (1987)	Specification for low voltage switchgear and controlgear assemblies: Part 2 Particular requirements for busbar trunking systems (busways)-(first revision)	March 2008	2
(17)	IS 8544 (Part 1): 1977	Motor starters for voltages not exceeding 1000 V: Part Direction line ac starters [superseded by IS 13947 (Part 4/Section 1): 1993]		2
(18)	IS 8544 (Part 2): 1977	Motor starters for voltages not exceeding 1000 V : Part 2 Star-delta starters [superseded by IS 13947 (Part 4/Section 1): 1993]		
(19)	IS 8544 (Part 3/ Sec 1): 1979	Motor starters for voltages not exceeding 1000 V : Part 3 Rheostatic motor starters, Section 1 General requirements [superseded by IS 13947 (Part 4/Section 1):1993]		
(20)	IS 8544 (Part 4): 1979	Motor starters for voltages not exceeding 1000 V: Part 4 Reduced voltage ac starters: two step auto-transformer starters [superseded by IS 13947 (Part 4/Section 1): 1993]		

POWER CABLE

CODES OF PRACTICE GUIDE

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 694:1990/ IEC 60227-1 to 5 (1979)	PVC Insulated cables for working voltages upto and including 1100 V	February 2010	5
(2)	IS 694: 2010	Polyvinyl chloride insulated sheathed and unsheathed cables with rigid and flexible conductor for rated voltages upto and including 450/750 V : Part 1 General requirements (fourth revision)		1
(3)	IS 1554 (Part 1): 1988/ IEC 60502 (1983)	PVC insulated (heavy duty) electric cables: Part 2 For working voltages upto and including 1100 V (Third revision)		
(4)	IS 3961 (Part 1): 1967	Recommended current ratings for cables: Part 1 Paper insulated lead sheathed cables	November 2011	
(5)	IS 4288:1988	PVC insulated (heavy duty) electric cables with solid aluminium conductors for voltages upto and including 1100 V (second revision) (withdrawn)		
(6)	IS 4289 (Part 1): 1984/ IEC 60245-5	Flexible cables for lifts and other flexible connections: Part 1 Elastomer insulated cables (first revision)		

ELECTRIC WIRING ACCESSORIES

CODES OF PRACTICE GUIDE

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 9537 (Part 1): 1980/ IEC 60614-1 (1978)	Conduits for electrical installations: Part 1 General Requirements	November 2010	(1)
(2)	IS 9537 (Part 2): 1981	Conduits for electrical installations: Part 2 Rigid steel conduits (superseding IS:1653)	May 2012	(2)
(3)	IS 3480:1966	Flexible steel conduits for electrical wiring	May 2012	(1)
(4)	IS 2667:1988	Fittings for rigid steel conduits for electrical wiring (first revision) [Superseded by IS 14768 (Part 2): 2003]	February 2008	
(5)	IS 3837:1976	Accessories for rigid steel conduits for electrical wiring (first revision)	May 2012	(1)
(6)	IS 9537 (Part 4): 1983	Conduits for electrical installations: Part 4 Pliable self-recovering conduits of insulating materials	May 2012	
(7)	IS 9537 (Part 5): 2000/ IEC 60614-2-3 (1990)	Conduits for a electrical installations: Part 5 Pliable conduits of insulating material [Superseding IS 6946]	June 2010	
(8)	IS 3419:1989	Fittings for rigid non-metallic conduits (second revision)	May 2012	
(9)	IS 14772:2000/ IEC 60670-1 (1989)	Enclosures for accessories for household and similar fixed electrical installations [Superseding IS 5133 (Part 1 and 2)]	May 2010	
(10)	IS 2412:1975	Link clips for electrical wiring (first revision)	May 2012	(2)
(11)	IS 371:1999	Ceiling roses (third revision)	March 2010	(4)
(12)	IS 3854:1997/ IEC 60669-1 (1998)	Switches for domestic and similar purposes (second revision)	July 2012	(6)
(13)	IS 4615:1968	Switch-socket outlets (non-interlocking type) (Withdrawn)		
(14)	IS 4160:2005/ IEC 60884-2-6 (1997)	Interlocking switch socket outlets - Specification (first revision)	June 2010	
(15)	IS 1293:2005/ IEC 60884-1 (2002)	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes - Specification (third revision)	June 2010	(5)

ELECTRICAL LAMPS AND THEIR AUXILIARIES**CODES OF PRACTICE GUIDE**

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 418:2004/ IEC 60064 (1993)	Tungsten filament lamps for domestic and similar general lighting purposes (fourth revision)	March 2009	(4)
(2)	IS 2418 (Part 1): 1977/ IEC 81 (1974)	Tubular fluorescent lamps for general lighting service: Part 1 Requirements and tests (first revision)	December 2010	(8)
(3)	IS 9900 (Part 1): 1981 / IEC 188 (1974)	High pressure mercury vapour lamps: Part 1 Requirements and test [Superseding IS 2183 and IS 7023]	October 2012	(4)
(4)	IS 9974 (Part 1): 1981/ IEC 662 (1980)	High pressure sodium vapour lamps : Part 1 General requirements and tests	October 2012	(4)
(5)	IS 1258:2005/ IEC 61184 (1997)	Bayonet lamp holders (fourth revision)	June 2010	(3)
(6)	IS 3323:1980/ IEC 60400 (1972)	Bi-pin lamp holders for tubular fluorescent lamps (first revision)	October 2012	(1)
(7)	IS 3324:1982/ IEC 400 (1972)	Holders for starters for tubular fluorescent lamps (first revision)	June 2008	
(8)	IS 2215:2006/ IEC 60155 (1993)	Starters for fluorescent lamps (third revision)	Jun 2010	
(9)	IS 1534 (Part 1): 1977 / IEC 82 (1973)	Ballasts for fluorescent lamps: Part 1 For switch start circuits (second revision)	July 2011	(5)
(10)	IS 1569:1976/ IEC 566	Capacitors for use in tubular fluorescent	July 2011	(1)
(11)	IS 6616:1982/ IEC 262 (1969)	Ballasts for high pressure mercury vapour Lamps (first revision)	July 2011	(1)

LIGHT FITTINGS AND LUMINAIRES**CODES OF PRACTICE GUIDE**

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 1913 (Part 1): 1978	General and safety requirements for luminaires: Part 1 Tubular fluorescent lamps (second revision)		
(2)	*IS 10322 (Part 1): 1982 / IEC 598 - 1(1979)	Luminaires: Part 1 General requirements	May 2010	
(3)	IS 10322 (Part 2): 1982 / IEC 598 - 1(1979)	Luminaires: Part 2 Constructional Requirements	May 2010	

CODES OF PRACTICE GUIDE

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(4)	IS 10322 (Part 5/ Sec. 2):2012	Luminaires: Part 5 Particular requirements, Sec 2 Recessed luminaires (First Revision)	March 2012	
(5)	IS 10322 (Part 5/ Sec. 3):2012/ IEC 60598-2-3 (1979)	Luminaires: Part 5 Particular requirements, Sec 3 Luminaires for road and street lighting (First revision)	March 2012	
(6)	IS 10322 (Part 5/ Sec 4):1987/ IEC 60598-2-4 (1979)	Luminaires: Part 5 Particular requirements, Section 4 Portable general purpose	May 2010	1
(7)	IS 10322 (Part 5/ Sec 5):1987/ IEC 60598-2-5	Luminaires: Part 5 Particular requirements, Section 5 Flood lights [superseding IS 1947]	May 2010	(1)
(8)	IS 3287:1965	Industrial lighting fittings with plastic reflectors		
(9)	IS 1777:1978	Industrial luminaires with metal reflectors (first revision)		
(10)	IS 2206 (Part 1): 1984	Flameproof electric lighting fittings: Part 1 Well-glass and bulkhead types (first revision)		
(11)	IS 3528:1966	Waterproof electric lighting fittings	May 2010	
(12)	IS 3553:1966	Watertight electric lighting fittings	May 2010	
(13)	IS 8030:1976/ IEC 162 (1972)	Luminaires for hospitals	March 2008	
(14)	IS 7537:1974	Road traffic signals	March 2008	
(15)	IS 9583:1981/ IEC 598-2-22 (1980)	Emergency lighting units	March 2008	

ELECTRICAL APPLIANCES

CODES OF PRACTICE GUIDE

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 302 (Part 1): 2008/ IEC 60335-1 (2006)	Safety of household and similar electrical appliances: Part 1 General requirements (sixth revision)		(1)
(2)	IS 2268:1994	Electric call bells and buzzers for indoor use (second revision)	March 2009	
(3)	IS 3412:1994	Electric water boilers (second revision)	March 2009	

ELECTRICAL INSTRUMENTS**CODES OF PRACTICE GUIDE**

Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 6236:1971/ IEC 60258 (1968)	Direct recording electrical measuring Instruments	January 2010	
(2)	IS 1248(Part 1): 2003/ IEC 600 51-1 (1997)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 1 General requirements (fourth revision)	Sep 2008	
(3)	IS 1248(Part 2): 2003/ IEC 600 51-2 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 2 Ammeters and voltmeters (third revision)	Aug 2008	
(4)	IS 1248(Part 3): 2003/ IEC 600 51-3 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 3 Wattmeters and varmeters (third revision)	Aug 2012	
(5)	IS 1248(Part 4): 2003/ IEC 600 51-4 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 4 Frequency meters (third revision)	Aug 2008	
(6)	IS 1248 (Part 5): 2003/ IEC 600 51-5 (1984)	Direct acting indicating analogue electrical measuring instruments and their accessories: Part 5 Phase meters, power factor meters and synchroscope (third revision)	Aug 2008	
(7)	IS 722(Part 1): 1998	AC electricity meters : General requirement and tests		
(8)	IS 722 (Part 2): 1977	AC electricity meters: Part 2 Single-phase whole-current watt-hour meters, Class 2 (first revision)		
(9)	IS 722 (Part 3): 1988	AC electricity meters: Part 3 Three-phase whole current and transformer operated and single-phase transformer operated watt-hour meters, class 2 (second revision)		
(10)	IS 722 (Part 5): 1980	AC electricity meters: Part 5 Volt-ampere hour meters for restricted power factor range, class 3.5 (first revision)		
(11)	IS 722 (Part 7/Sec 1): 1987	AC electricity meters: Part 7 Volt-ampere hour meters for full power factor range, Section 1 General requirements (first revision)		
(12)	IS 722 (Part 8): 1972	AC electricity meters: Part 8 Single-phase 2-wire whole current watt-hour meter (class 1.0)		
(13)	IS 722 (Part 9): 1972	AC electricity meters: Part 9 Three-phase whole current and transformer operated watt-hour meters and single-phase two-wire transformer operated watt-hour meters (class 1.0)		
(14)	IS 8530: 1977 IEC 60211:1966	Maximum demand indicators (class 1)		
(15)	*IS 2992:1987	Insulation resistance testers, hand operated (magneto generator type) (second revision)	Jan 2010	

INSTRUMENT TRANSFORMERS**CODES OF PRACTICE GUIDE**

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 2705 (Part 1): 1992/ IEC 60185 (1966)	Current transformers: Part 1 General requirements (second revision)	Aug 2012	(1)
(2)	IS 2705 (Part 2): 1992/ IEC 60185 (1966)	Current transformers: Part 2 Measuring current transformers (second revision)	Aug 2012	
(3)	IS 2705 (Part 3): 1992/ IEC 60185 (1966)	Current transformers: Part 3 Protective current transformers (second revision)	Aug 2012	
(4)	IS 2705 (Part 4): 1992/ IEC 60185 (1966)	Current transformers: Part 4 Protective current transformers for special purpose applications (second revision)	Aug 2012	
(5)	IS 6949:1973	Summation current transformers	Sep 2011	

FUSES**CODES OF PRACTICE GUIDE**

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 9224 (Part 1): 1979	Low voltage fuses: Part 1 General requirements [superseded by IS 13703 (Part 1):1993]		
(2)	IS 9224 (Part 2): 1979	Low voltage fuses: Part 2 Supplementary requirements for fuses for industrial applications (superseding IS 2208) [superseded by IS 13703 (part 2/Section 1):1993]		
(3)	IS 2086:1993	Carriers and bases used in rewirable type electric fuses for voltages upto 650 V (third revision) [Superseding IS 8724]	Mar 2009	(1)
(4)	IS 9926:1981	Fuse wires used in rewirable type electric fuses upto 650 volts	Mar 2011	
(5)	IS 8187:1976/ IEC 269-3 (1973)	D-type fuses		

MISCELLANEOUS**CODES OF PRACTICE GUIDE**

<i>Sl.No.</i>	<i>Standard</i>	<i>Title</i>	<i>Reaffirm Date</i>	<i>Amdt.</i>
(1)	IS 2551:1982	Danger notice plates (first revision)	Mar 2010	
(2)	IS 2448 (Part 1): 1963	Adhesive insulating tapes for electrical purposes: Part 1 Tapes with cotton textile substrates	Oct 2010	(5)

ELECTROTECHNICAL VOCABULARY**CODES OF PRACTICE GUIDE**

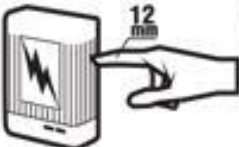
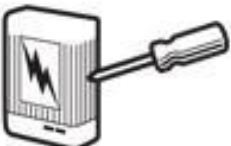
Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 1885 (Part 1): 1961	Electrotechnical vocabulary: Part 1 Fundamental Definitions	Jul 2012	(2)
(2)	IS 1885 (Part 9): 1992/ IEC 60050 (446):1983	Electrotechnical Vocabulary: Part 9 Electrical relays (second revision)	Jul 2012	
(3)	IS 1885 (Part 11): 1966	Electrotechnical vocabulary: Part 11 Electrical Measurements	Jul 2012	
(4)	IS 1885 (Part 16/ Sec 1):1968	Electrotechnical vocabulary: Part 16 Lighting, Section 1 General aspects	Jul 2012	
(5)	IS 1885 (Part 16/ Sec. 2):1968	Electrotechnical vocabulary: Part 16 Lighting, Section 2 General illumination, lighting fittings and lighting for traffic and signaling	Jul 2012	
(6)	IS 1885 (Part 16/ Sec. 3):1967	Electrotechnical vocabulary: Part 16 Lighting, Section 3 Lamps and auxiliary apparatus	Jul 2012	
(7)	IS 1885 (Part 17): 1979	Electrotechnical vocabulary: Part 17 Switchgear and controlgear (first revision)	Jul 2012	
(8)	IS 1885 (Part 32):1993/ IEC 60050 (461): 1984	Electrotechnical Vocabulary: Part 32 Electric cables (first revision)	Mar 2009	

SAFETY**CODES OF PRACTICE GUIDE**

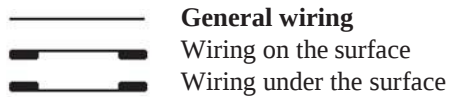
Sl.No.	Standard	Title	Reaffirm Date	Amdt.
(1)	IS 4770:1991	Rubber Gloves for electrical purposes		
(2)	IS 5424:1969	Rubber mats for electrical purpose (Superseded by IS 15652:2006)	April 2011	(2)

IP Rating Chart

IP (Ingress Protection) Ratings Guide

SOLIDS		WATER	
1	 Protected against a solid object greater than 50 mm such as a hand.	1	 Protected against vertically falling drops of water. Limited ingress permitted.
2	 Protected against a solid object greater than 12.5 mm such as a finger.	2	 Protected against vertically falling drops of water with enclosure tilted up to 15 degrees from the vertical. Limited ingress permitted.
3	 Protected against a solid object greater than 2.5 mm such as a screwdriver.	3	 Protected against sprays of water up to 60 degrees from the vertical. Limited ingress permitted for three minutes.
4	 Protected against a solid object greater than 1 mm such as a wire.	4	 Protected against water splashed from all directions. Limited ingress permitted.
5	 Dust Protected. Limited ingress of dust permitted. Will not interfere with operation of the equipment. Two to eight hours.	5	 Protected against jets of water. Limited ingress permitted.
6	 Dust tight. No Ingress of dust. Two to eight hours.	6	 Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.
Rating Example: IP 6 5 INGRESS PROTECTION		7	 Protection against the effects of immersion in water between 15 cm and 1 m for 30 minutes.
		8	 Protection against the effects of immersion in water under pressure for long periods.

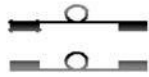
CONVENTIONAL SIGNS & SYMBOLS FOR ELECTRICAL INSTALLATION



General wiring

Wiring on the surface

Wiring under the surface



WIRING IN CONDUIT

Conduit on surface

Consealed conduit Wiring



going upwards Wiring

going downwards

Wiring passing vertically

FUSE BOARDS

LIGHTING CIRCUIT FUSE-BOARDS



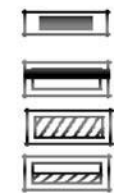
Main fuse-board without switches Main

fuse-board with switches

Distribution fuse-board without switches

Distribution fuse-board with switches

POWER CIRCUIT FUSE-BOARDS



Main fuse-board without switches Main

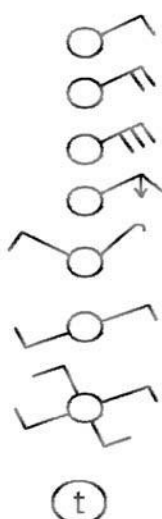
fuse-board with switches

Distribution fuse-board without switches

Distribution fuse-board with switches

SWITCHES & SWITCH OUTLETS

ONE WAY SWITCH



Single pole

Two pole

Three pole

Single pole pull switch

Multi-position switch (for different degrees of lighting)

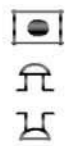
Two-way switch

Intermediate switch

Period limiting switch

	Time switch
	Pendant Switch
	Push button
	Luminous push button
	Restricted access push button
SOCKET OUTLETS	
	Socket-outlet, 5A
	Socket-outlet, 15A
	Combined switch & socket-outlet, 5A
	Combined switch & socket-outlet, 15A
	Interlocking switch & socket-outlet, 5A
	Interlocking switch & socket-outlet, 15A
LAMPS AND LIGHTING APPARATUS	
	Lamp or outlet for lamp
	Group of three 40W lamps
	Lamp mounted on a wall
	Lamp mounted on a ceiling
	Counter-weight lamp fixture
	Chain lamp fixture
	Road lamp fixture
	Lamp fixture with built-in-switch
	Lamp fed from variable voltage supply
	Emergency lamp
	Panic lamp
	Bulkhead lamp
	Water-tight lighting fitting
	Batten lamp holder
	Projector
	Spot light
	Flood light
	Flourescent lamp
	Group of three 40 W flourescent lamps
ELECTRICAL APPLIANCES	
	Generators

BELLS, BUZZERS



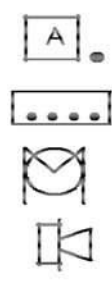
Bell push
Bell Buzzer

FIRE ALARM

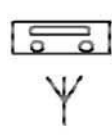


Fire alarm push
Automatic contact
Bell connected to fire alarm
Fire alarm indicator
(At 'N' insert number of ways)

PUBLIC ADDRESS SYSTEM

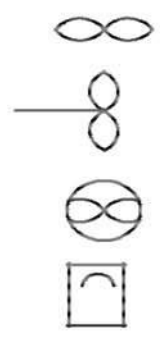


Amplifier
Control
board
Microphone outlet
Loudspeaker outlet



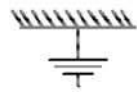
RADIO RECEPTION OUTLETS
Receiver outlet Aerial

FIXED APPARATUS OUTLETS



Ceiling fan
Bracket fan
Exhaust fan
Fan regulator

EARTHING



Earth point

Interior Lighting Power for ECBC Buildings – Building Area Method

<i>Building Type</i>	<i>LPD (W/m²)</i>	<i>Building Area Type</i>	<i>LPD (W/m²)</i>
Office Building	9.5	Motion picture theater	9.43
Hospitals	9.7	Museum	10.2
Hotels	9.5	Post office	10.5
Shopping Mall	14.1	Religious building	12.0
University and Schools	11.2	Sports arena	9.7
Library	12.2	Transportation	9.2
Dining: bar lounge/leisure	12.2	Warehouse	7.08
Dining: cafeteria/fast food	11.5	Performing arts theater	16.3
Dining: family	10.9	Police station	9.9
Dormitory	9.1	Workshop	14.1
Fire station	9.7	Automotive facility	9.0
Gymnasium	10.0	Convention center	12.5
Manufacturing facility	12.0	Parking garage	3.0

In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply.

Interior Lighting Power for ECBC+ Buildings – Building Area Method

<i>Building Area Type</i>	<i>LPD (W/m²)</i>	<i>Building Area Type</i>	<i>LPD (W/m²)</i>
Office Building	7.6	Motion picture theater	7.5
Hospitals	7.8	Museum	8.2
Hotels	7.6	Post office	8.4
Shopping Mall	11.3	Religious building	9.6
University and Schools	9.0	Sports arena	7.8
Library	9.8	Transportation	7.4
Dining: bar lounge/leisure	9.8	Warehouse	5.7
Dining: cafeteria/fast food	9.2	Performing arts theater	13.0
Dining: family	8.7	Police station	7.9
Dormitory	7.3	Workshop	11.3
Fire station	7.8	Automotive facility	7.2
Gymnasium	8.0	Convention center	10.0
Manufacturing facility	9.6	Parking garage	2.4

In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply.

Interior Lighting Power for SuperECBC Buildings – Building Area Method

<i>Building Area Type</i>	<i>LPD (W/m²)</i>	<i>Building Area Type</i>	<i>LPD (W/m²)</i>
Office Building	5.0	Motion picture theater	4.7
Hospitals	4.9	Museum	5.1
Hotels	4.8	Post office	5.3
Shopping Mall	7.0	Religious building	6.0
University and Schools	6.0	Sports arena	4.9
Library	6.1	Transportation	4.6
Dining: bar lounge/leisure	6.1	Warehouse	3.5
Dining: cafeteria/fast food	5.8	Performing arts theater	8.2
Dining: family	5.5	Police station	5.0
Dormitory	4.6	Workshop	7.1
Fire station	4.9	Automotive facility	4.5
Gymnasium	5.0	Convention center	6.3
Manufacturing facility	6.0	Parking garage	1.5

In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply.

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

1. Climate Type – Composite

		Business	Educational	Hospitality	Healthcare	Assembly
		Office (Day Time)	College	Resorts	Hospital	Transport Services
Site	Location	Chhattisgarh				
	Weather Data	-	-	-	-	-
Building Info	Connected load KW or Contract demand kVA	50 kW or greater or a contract demand of 60kVA or greater				
	Occupancy Type	Daytime (12 hours)	Daytime (12 hours)	All Day (24 hours)	All Day (24 hours)	All Day (24 hours)
EXTERNAL LOADS						
External Wall	Assembly	As per selection	As per selection	As per selection	As per selection	As per selection
	U-Value (W/m ² .K)	0.63	0.40	0.40	0.40	0.40
Exposed Roof	Assembly	As per selection	As per selection	As per selection	As per selection	As per selection
	U-Value (W/m ² .K)	0.33	0.33	0.2	0.33	0.33
	Roof Reflectivity	>0.7	>0.7	>0.7	>0.7	>0.7
Fenestration	Windows					
	Window to Wall Ratio	40% (Max)	40% (Max)	40% (Max)	40% (Max)	40% (Max)
	Glass Type	As per selection	As per selection	As per selection	As per selection	As per selection
	U-Value (W/m ² .K)	3.0	3.0	3.0	3.0	3.0
	SHGC non North	0.27	0.27	0.27	0.27	0.27
	SHGC North	0.50	0.50	0.50	0.50	0.50
	VLT	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)
	Window Shades	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination
	Skylights					
	Skylight to Roof Ratio	5% (Max)	5% (Max)	5% (Max)	5% (Max)	5% (Max)
	Skylight Type	As per design	As per design	As per design	As per design	As per design
	U-Value (W/m ² .K)	4.25 (Max)	4.25 (Max)	4.25 (Max)	4.25 (Max)	4.25 (Max)
	SHGC	0.35 (Max)	0.35 (Max)	0.35 (Max)	0.35 (Max)	0.35 (Max)
	VLT	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)
	Skylight Shades	As per design	As per design	As per design	As per design	As per design

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

		Business	Educational	Hospitality	Healthcare	Assembly
		Office (Day Time)	College	Resorts	Hospital	Transport Services
INTERNAL LOADS						
Lighting: LPD in W/m ² (Building Area method)	Building Area method <i>Note- refer ECBC 2017 for Space by space method</i>	9.5	11.2	9.5	9.7	9.2
Daylight sensors	Perimeters only	Delay of 5 mins. Stepdown to 50% Power.				
Sensors	Occupancy sensors	90% of interior lighting fittings > 300m ²				
Equipment EPD	W/m ²	20	20	20	20	20
EXTERIOR LIGHTING (For all building types)						
Power Limits	Building entrance (with canopy)	10 W/m ² of canopied area				
	Building entrance (w/o canopy)	90 W/ linear m of door width				
	Building exit	60 W/lin m of door width				
	Building façade	5.0 W/m ² of vertical façade area				
	Emergency signs, ATM kiosks, Security areas facade	1.0 W/m ²				
	Driveways and parking (open/ external)	1.6 W/m ²				
	Pedestrian walkways	2.0 W/m ²				
	Stairways	10.0 W/m ²				
	Landscaping	0.5 W/m ²				
	<i>Note- Exterior lighting shall be controlled by a photo-sensor or astronomical time switch that is capable of automatically turning off the exterior lighting when daylight is available or the lighting is not required.</i>					
HVAC SYSTEM						
HVAC	System Efficiency Cop/EER					
	Water cooled Chillers	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP
	Air cooled Chillers	< 260 kW _r - 2.8 COP	< 260 kW _r - 2.8 COP	< 260 kW _r - 2.8 COP	< 260 kW _r - 2.8 COP	< 260 kW _r - 2.8 COP
		≥260 kW _r - 3.0 COP	≥260 kW _r - 3.0 COP	≥260 kW _r - 3.0 COP	≥260 kW _r - 3.0 COP	≥260 kW _r - 3.0 COP

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

	Unitary, Split, Packaged Air Conditioners	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER
	VRF	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER
		>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER
		>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER
	Cooling Set Point	25 °C	25 °C	25 °C	25 °C	25 °C
	COP/EER	EER: 3.02	EER: 3.02	EER: 3.02	EER: 3.02	EER: 3.02
	Fresh Air	As per NBC 2016, Minimum Ventilation Rates				
	Fan Speed (Kw/cfm)	0.0003	0.0003	0.0003	0.0003	0.0003
	Cooling capacity sizing	1.15	1.15	1.15	1.15	1.15
	Heating capacity sizing	1.25	1.25	1.25	1.25	1.25
Chilled and condenser water pumps efficiency	Design Air Flow (Temperature difference)	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C
	Chilled water pump (Secondary and primary)	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump
	Condenser Water Pump	17.7 W/ kW _r	17.7 W/ kW _r	17.7 W/ kW _r	17.7 W/ kW _r	17.7 W/ kW _r
Cooling Tower Efficiency Requirements	Pump Efficiency (minimum)	70%	70%	70%	70%	70%
	Fan control	0.017 kW/kW _r	0.017 kW/kW _r	0.017 kW/kW _r	0.017 kW/kW _r	0.017 kW/kW _r
		0.31 kW/ L/s	0.31 kW/ L/s	0.31 kW/ L/s	0.31 kW/ L/s	0.31 kW/ L/s
Economizers		50% of expected system cooling load at outside air temperatures of 10°C dry-bulb/7.2°C wet-bulb and below.				
Heating	Equipment type	Boiler/Hot water	Boiler/Hot water	Boiler/Hot water	Boiler/Hot water	Boiler/Hot water
	Source	Gas or oil fired	Gas or oil fired	Gas or oil fired	Gas or oil fired	Gas or oil fired
	fuel utilization efficiency (FUE)	80 %	80 %	80 %	80 %	80 %

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

		Business	Educational	Hospitality	Healthcare	Assembly
		Office (Day Time)	College	Resorts	Hospital	Transport Services
ELECTRICAL & RENEWABLE						
ELECTRICAL	Plumbing (kW)	High Efficiency IE-2 level motors	High Efficiency IE-2 level motors	High Efficiency IE-2 level motors	High Efficiency IE-2 level motors	High Efficiency IE-2 level motors
	DG Sets	BEE 3 star or highest	BEE 3 star or highest	BEE 3 star or highest	BEE 3 star or highest	BEE 3 star or highest
	UPS	kVA < 20-90.2% 20 ≤ kVA ≤ 100 - 91.9% kVA > 100-93.8%	kVA < 20-90.2% 20 ≤ kVA ≤ 100 - 91.9% kVA > 100-93.8%	kVA < 20-90.2% 20 ≤ kVA ≤ 100 - 91.9% kVA > 100-93.8%	kVA < 20-90.2% 20 ≤ kVA ≤ 100 - 91.9% kVA > 100-93.8%	kVA < 20-90.2% 20 ≤ kVA ≤ 100 - 91.9% kVA > 100-93.8%
Renewable energy	Capacity	Minimum 2% of total electrical load [Business > 20,000 m ² - Minimum 3% of total electrical load]	Minimum 2% of total electrical load	Minimum 2% of total electrical load [Star Hotel > 20,000 m ² Minimum 3% of total electrical load]	Minimum 2% of total electrical load	Minimum 2% of total electrical load

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

2. Climate Type – Warm & Humid

		Business	Educational	Hospitality	Healthcare	Assembly
		Office (Day Time)	College	Resorts	Hospital	Transport Services
Site	Location	Chhattisgarh				
	Weather Data	-	-	-	-	-
Building Info	Connected load KW or Contract demand kVA	50 kW or greater or a contract demand of 60kVA or greater				
	Occupancy Type	Daytime (12 hours)	Daytime (12 hours)	All Day (24 hours)	All Day (24 hours)	All Day (24 hours)
EXTERNAL LOADS						
External Wall	Assembly	As per selection	As per selection	As per selection	As per selection	As per selection
	U-Value (W/m ² .K)	0.63	0.40	0.40	0.40	0.40
Exposed Roof	Assembly	As per selection	As per selection	As per selection	As per selection	As per selection
	U-Value (W/m ² .K)	0.33	0.33	0.2	0.33	0.33
	Roof Reflectivity	>0.7	>0.7	>0.7	>0.7	>0.7
Fenestration	Windows					
	Window to Wall Ratio	40% (Max)	40% (Max)	40% (Max)	40% (Max)	40% (Max)
	Glass Type	As per selection	As per selection	As per selection	As per selection	As per selection
	U-Value (W/m ² .K)	3.0	3.0	3.0	3.0	3.0
	SHGC non North	0.27	0.27	0.27	0.27	0.27
	SHGC North	0.50	0.50	0.50	0.50	0.50
	VLT	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)
	Window Shades	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination	South- Horizontal East/west- Vertical or combination
	Skylights					
	Skylight to Roof Ratio	5% (Max)	5% (Max)	5% (Max)	5% (Max)	5% (Max)
	Skylight Type	As per design	As per design	As per design	As per design	As per design
	U-Value (W/m ² .K)	4.25 (Max)	4.25 (Max)	4.25 (Max)	4.25 (Max)	4.25 (Max)
	SHGC	0.35 (Max)	0.35 (Max)	0.35 (Max)	0.35 (Max)	0.35 (Max)
	VLT	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)	0.27 (Max)
	Skylight Shades	As per design	As per design	As per design	As per design	As per design

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

		Business	Educational	Hospitality	Healthcare	Assembly
		Office (Day Time)	College	Resorts	Hospital	Transport Services
INTERNAL LOADS						
Lighting: LPD in W/m ² (Building Area method)	Building Area method <i>Note- refer ECBC 2017 for Space by space method</i>	9.5	11.2	9.5	9.7	9.2
Daylight sensors	Perimeters only	Delay of 5 mins. Stepdown to 50% Power.				
Sensors	Occupancy sensors	90% of interior lighting fittings > 300m ²				
Equipment EPD	W/m ²	20	20	20	20	20
EXTERIOR LIGHTING (For all building types)						
Power Limits	Building entrance (with canopy)	10 W/m ² of canopied area				
	Building entrance (w/o canopy)	90 W/ linear m of door width				
	Building exit	60 W/lin m of door width				
	Building façade	5.0 W/m ² of vertical façade area				
	Emergency signs, ATM kiosks, Security areas facade	1.0 W/m ²				
	Driveways and parking (open/ external)	1.6 W/m ²				
	Pedestrian walkways	2.0 W/m ²				
	Stairways	10.0 W/m ²				
	Landscaping	0.5 W/m ²				
	<i>Note- Exterior lighting shall be controlled by a photo-sensor or astronomical time switch that is capable of automatically turning off the exterior lighting when daylight is available or the lighting is not required.</i>					
HVAC SYSTEM						
HVAC	System Efficiency COP/EER					
	<i>Water cooled Chillers</i>	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP	< 260 kW _r - 4.7 COP
	<i>Air cooled Chillers</i>	< 260 kW _r - 2.8 COP ≥260 kW _r - 3.0 COP	< 260 kW _r - 2.8 COP ≥260 kW _r - 3.0 COP	< 260 kW _r - 2.8 COP ≥260 kW _r - 3.0 COP	< 260 kW _r - 2.8 COP ≥260 kW _r - 3.0 COP	< 260 kW _r - 2.8 COP ≥260 kW _r - 3.0 COP

ENERGY CONSERVATION BUILDING CODE

ECBC Template for developing building design

	Unitary, Split, Packaged Air Conditioners	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER	> 10.5 kW _r - 3.3 EER
	VRF	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER	< 40 kW _r - 3.28 EER
		>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER	>= 40 and < 70 kW _r - 3.26 EER
		>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER	>= 70 kW _r - 3.02 EER
	Cooling Set Point	25 °C	25 °C	25 °C	25 °C	25 °C
	COP/EER	EER: 3.02	EER: 3.02	EER: 3.02	EER: 3.02	EER: 3.02
	Fresh Air	As per NBC 2016, Minimum Ventilation Rates				
	Fan Speed (Kw/cfm)	0.0003	0.0003	0.0003	0.0003	0.0003
	Cooling capacity sizing	1.15	1.15	1.15	1.15	1.15
	Heating capacity sizing	1.25	1.25	1.25	1.25	1.25
Chilled and condenser water pumps efficiency	Design Air Flow (Temperature difference)	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C	Cooling - 11 °C Heating - 18 °C
	Chilled water pump (Secondary and primary)	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump	18.2 W/ kW _r with VFD on secondary pump
	Condenser Water Pump	17.7 W/ kW _r	17.7 W/ kW _r	17.7 W/ kW _r	17.7 W/ kW _r	17.7 W/ kW _r
	Pump Efficiency (minimum)	70%	70%	70%	70%	70%
Cooling Tower Efficiency Requirements	Fan control	0.017 kW/kW _r 0.31 kW/ L/s	0.017 kW/kW _r 0.31 kW/ L/s	0.017 kW/kW _r 0.31 kW/ L/s	0.017 kW/kW _r 0.31 kW/ L/s	0.017 kW/kW _r 0.31 kW/ L/s
Economizers		Exempt for Warm & Humid Climate				
Heating	Equipment type	Boiler/Hot water	Boiler/Hot water	Boiler/Hot water	Boiler/Hot water	Boiler/Hot water
	Source	Gas or oil fired	Gas or oil fired	Gas or oil fired	Gas or oil fired	Gas or oil fired
	fuel utilization efficiency (FUE)	80 %	80 %	80 %	80 %	80 %

