माझगांव डॉक शिपबिल्डर्स लिमिटेड

(भारत सरकार का उपक्रम)
राष्ट्र के पोत निर्माता
डॉकयार्ड रोड, माझगांव
मुंबई – ४०००१०
भारत

MAZAGON DOCK SHIPBUILDERS LIMITED
(A Government of India Undertaking)
Shipbuilders to the Nation
Dockyard Road, Mazagon,
Mumbai 400 010.
INDIA

ई-निविदा फॉर्म दो हिस्सो में

e-TENDER ENQUIRY FORM (TEF) Two-Bid System

मंडल: पोत निर्माण
DIVISION: SHIP BUILDING

विभाग: बाह्यस्त्रोत-तकनीकी सेवाएँ
DEPARTMENT: OTS-TECHNICAL SERVICES

निविदा क्रमांक: १९०००००२४२
TENDER NO: 1900000242

निविदा जारी दिनांक : १७ नवम्बर २०२५
TENDER DATE: 17 November'2025

निविदा देय दिनांक एवं समय: ०९ दिसम्बर २०२५ दोपहर १५:३० बजे
CLOSING DATE & TIME: 09 December 2025 at 15:30 Hrs

भाग १ - तकनीकी एवं वाणिज्यिक हिस्सा खोलने (ऑनलाइन) कि तिथि एवं समय: १० दिसम्बर २०२५, दोपहर १५:३० बजे से
Online Opening of Part-I (Techno-commercial Bid): 10 December 2025 at 15:30 Hrs. IST onwards

माझगांव डॉक शिपबिल्डर लिमिटेड प्रासिद्ध निविदाकर्ताओं / विक्रेताओं से निम्नलिखित कार्य के लिए प्रतियोगी ऑनलाइन निविदाएँ दो हिस्सो में (भाग १ - तकनीकी एवं वाणिज्यिक हिस्सा और भाग २ - मूल्य हिस्सा) अपने ई-प्रॉक्यूरमेंट पोर्टल https://eprocuremdl.nic.in पे आमंत्रित करते हैं।

MAZAGON DOCK SHIPBUILDERS LIMITED hereinafter referred to as **MDL**, INVITES ONLINE COMPETITIVE BIDS from reputed Bidders in **TWO BID SYSTEM** (Part-I Techno-Commercial Bid and Part-II Price Bid) on e-procurement portal https://eprocuremdl.nic.in for the following Work / Services:

कार्य का वर्णन
DESCRIPTION OF WORK

नौसेना डॉकयार्ड मे कार्यो सहित डॉकयार्ड रोड,सीवरी, अनीक चेंबूर, गव्हान, न्हावा यार्ड, दक्षिण यार्ड अनेक्स, आवासीय क्वार्टरों में स्थित एमडीएल परिसर के भीतर छोटे सिविल कार्यो सहित विद्युत कार्यो के लिए २०२५-२०२७ द्विवार्षिक दर अनुबंध।

Biennial Rate Contract 2025-2027 for Electrical Works Including minor civil works within MDL premises located at Dockyard Road, Sewree, Anik Chembur, Gavhan, Nhava Yard, South Yard Annex., Residential Quarters at Dockyard Road and Navi Mumbai including works at Naval Dockyard.

निविदा क्र.: १९०००००२४२

TENDER NO: 1900000242

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1. प्रस्तावना /PREAMBLE

1.1. Mazagon Dock Shipbuilders Ltd. (MDL), a listed Company, hereinafter referred as Employer (Client), is a Public Sector Undertaking by the Government of India under the administrative control of Department of Defence production, Ministry of Defence.

1.2. MDL's main business/ activities are Shipbuilding, Submarine Construction and Heavy Engineering Works.

MDL intends to undertake Biennial Rate Contract for Electrical Works Including minor civil works in MDL, Mumbai/Navi Mumbai.

2. काम का संक्षिप्त विवरण/BRIEF SCOPE OF WORK: Bidder shall refer detailed Scope of Work and Technical Specifications which is attached separately at **Enclosure 21**. The Safety Instructions & Statutory compliances are attached at Annexure A & B respectively.

3. निविदाकर्ताओं के लिए निर्देश/ INSTRUCTIONS TO THE BIDDERS:

3.1. This is an e-tender and bids have to be submitted online ONLY. It is the sole responsibility of the bidders to submit their bids online in time. Bidders are, therefore, advised to commence the bidding process on the e-procurement portal WELL IN ADVANCE (preferably 3-4 days prior to tender closing date) and not wait for last minute submission of their bids. MDL reserves the right for grant of extension or otherwise without assigning any reason. Bidder's failure to complete submission of their online bids in time on account of reasons such as SLOW SPEED OF SERVER, TECHNICAL PROBLEMS etc. shall not be entertained and EXTENSION OF SUBMISSION TIME shall not be granted on this account.

3.2. In case any bidder intending to respond against the tender and is not having the DSC to facilitate uploading of his bid, should approach the Service Provider at least 10 working days in advance of the tender closing date requesting for DSC. The request so made to the Service Provider should simultaneously be forwarded to MDL Dealing Officer. In case the DSC is not received within 3 to 4 working days of the request by the bidder, the Head of the concerned Commercial section be informed immediately. If the DSC is not received from the Service Provider three working days prior to the tender closing date, suitable extension to the tender closing date shall be considered if requested by the concerned bidder on submission of requisite supporting documents (scanned copy of application submitted to the service provider).

3.3. In case of any discrepancies'

3.3.1. Between Hindi and English Versions of the Tender Clauses, English Version will prevail.

3.3.2. In the drawings or between the drawings, technical specifications, and/ or schedule of items/quantities, the contractor shall seek clarification from MDL and shall carry out the work in accordance with the clarification furnished by MDL.

3.3.3. MDL at its discretion, may follow the following order of preference- Description of Schedule of Bill of Quantities, Technical Specifications, Drawings, General Condition of Contract.

3.4. Tender due date extension may be considered if extension of time asked by bidder in 3 days' in advance.

3.5. The online bid can be submitted by the authorized representative of the bidder as detailed below,

3.5.1. By the Proprietor, in case of a proprietary firm; or

3.5.2. By a Partner, in case of a partnership firm and/or a limited liability partnership;
3.5.3. By a duly authorized person holding the Power of Attorney, in case of a Limited or Private Limited Company or a corporation.

3.6. In case of any techno-commercial query prior to submission of bids, the bidder(s) are requested to contact the following from MDL. Letter(s)/emails shall be addressed to GM/HOD (OTS), MDL. Contact details are as under:

MDL	
Shri. Anant Garkhedkar DGM/HOS (OTS-TS) Email: apgarkhedkar@mazdock.com Tel No: +91 22 23763086 Mob No: 9324019254	Mr Naushad C S, DGM (OTS) Email: nshaikh@mazdock.com Tel No: +91 22 2376 3312

3.7. Before submission of the tender, the bidder shall visit the site, examine the General Conditions of Contract, the Specifications (including any drawings and other specifications referred to therein), the schedules and the Bill of Quantities. In case of any ambiguity or discrepancy between any of these documents or between figured and measured dimensions, the bidder should immediately refer the matter to MDL.

3.8. **Corrigendum:**
3.8.1. Before the deadline for submitting bids, MDL may update, amend, modify, or supplement the information, assessment or assumptions contained in the Tender Document by issuing a corrigendum.
3.8.2. The corrigendum shall be published in the same manner as the original Tender Document. Without any liability or obligation, the Portal may send intimation of such corrigendum to bidders who have downloaded the document under their login. However, the bidders' responsibility is to check the website(s) for any corrigendum. Any corrigendum thus issued shall be considered a part of the Tender Document. To give reasonable time to the prospective bidders to take such corrigendum into account in preparing their bids, MDL may suitably extend the deadline for the bid submission, as necessary. After MDL makes such modifications, any Bidder who has submitted his bid in response to the original invitation shall have the opportunity to either withdraw his bid or re-submit his bid superseding the original bid within the extended time of submission.

3.9. Mazagon Dock Shipbuilders Limited will not be responsible for any costs or expenses incurred by the Bidder in connection with the preparation and submission of his bid or for any other expenses incurred in connection with such bidding regardless of the conduct or outcome of the tendering process including cancellation of this tender process.

3.10. The bidder shall not take any benefit of grammatical or printing mistakes, which may have occurred.

3.11. DEVIATIONS: - Deviations, if any, from Terms, Conditions & Technical requirements specified in the Tender Enquiry, General Conditions of Contract (GCC) should be clarified from MDL well before the closing date of the tender. Deviations put up along with the tender is generally discouraged and not accepted.

3.12. Information relating to the examination, clarification, evaluation and comparison of bids, and recommendations for the award of a contract, shall not be disclosed to bidders or any other person not officially concerned with such a process until the award to the successful bidder has been announced.

3.13. From the time of bid opening to the time of contract award, no bidder shall contact MDL on any matter related to the bid, except on request and prior written permission.

3.14. Any effort by the bidder to influence MDL in bid evaluation, bid comparison or contract award decisions will vitiate the process and will result in the rejection of the bidder's bid.

4. ई-टेंडरिंग के लिये मार्गदर्शन /GUIDANCE FOR E-TENDERING:

4.1. No offer in sealed envelope will be accepted against e-Procurement.

4.2. Bidders can participate in online bidding
4.2.1. By registering with above referred portal for User ID and password.
4.2.2. By obtaining class III B DSC (Digital Signature Certificate) for secured bidding.

4.3. For any further details on e-tendering & Digital Signature Certificate (DSC), following are the contact details – email: eproc-support@gov.in , global support number - +91-120-4200462/+91-120-4001002, Mobile No -+918826246593.

4.4. For uploading the tender details, DSCs issued by the following are acceptable: i) n-Code ii) MTNL iii) TCS iv) SIFY

4.5. For mapping of DSC, representative of National Informatics Centre may be contacted.

4.6. Bidders who had earlier participated in MDL tenders on e-Procurement portal https://mdl.eproc.in need to register again on the current e-Procurement portal https://eprocuremdl.nic.in.

5. दो प्रणाली में ऑनलाइन प्रस्ताव प्रस्तुत करे /ONLINE SUBMISSION OF OFFER IN TWO-BID SYSTEM:

5.1. Offer must be submitted in Two parts i.e. Part-I (Techno-Commercial Bid) and Part-II (Price Bid) as appearing online on the portal https://eprocuremdl.nic.in

5.1.1. **Techno-Commercial (Part-I) Bid:** Bidders shall submit/upload scanned copy of the following duly filled in, signed & stamped with company seal in online Part (I) bid: -

i. In respect of technical requirements of the tender:
   a. Documentary evidence in support of Past experience and Performance on Similar work(s) during the last 7 years, stipulated under **TEF Clause No.7,** as applicable in the format attached at **Enclosure-8**.
   b. Documents in support of general construction experience (Annual Turnover) **TEF Clause No.7.1.3.** in the format attached at **Enclosure-3**
   c. Scanned copy of Bidder's company profile.
   d. License for execution of Electrical works from the concerned authorities/ organization/ bodies.

ii. In respect of Commercial requirements of the tender:
   a. Bidder's Undertaking at **Enclosure-1**.
   b. Acceptance on clauses of Tender Enquiry (TEF) in the Prescribed Format **appearing online** stating 'Accepted' OR 'Not Accepted' as applicable for each of the clause in the format attached at **Enclosure-2**.
   c. Acceptance on clauses of General Conditions of Contract (GCC) in the Prescribed Format appearing online stating 'Accepted' OR 'Not Accepted' as applicable for each of the clause in the format attached at **Enclosure-4.**
   d. Deviations, if any, from Terms, Conditions & Technical requirements specified in the Tender Enquiry, GCC with reasons thereof shall be clearly indicated against the relevant clause(s) in the format attached at **Enclosure-5**.

e. CA Audited & certified Average Annual financial turnover during the last 3 years ending **31st March, 2024 TEF Clause No.7.2.7(a).** Bidders shall upload scanned copies of Audit certified Balance Sheets & Profit/Loss Accounts for the last 3 years. Draft Audited Reports are not acceptable.

f. Bidders shall furnish Available bid Capacity as required in **TEF Clause No. 7.2.5** and **Enclosure-6 & 7** duly certified by Charted Accountant and scanned copy of the same shall be uploaded in online Part-I bid.

g. Bidder shall submit Declaration certificate for Local Content as per **TEF Clause No. 40** and in the format attached at **Enclosure-10(A)**. **A Sample filled up Form is appended for reference.**

h. Bidder shall submit Declaration in respect of restriction under Rule 144 (xi) of the General Financial Rules (GFRs), 2017 **TEF Clause No. 41** in the format attached at **Enclosure-10 (E).**

i. Bidder shall submit Declaration in respect debarred under Public Procurement Policy (PPP) Make In India (MII) **TEF Clause No.40** order, in the format attached at **Enclosure-10 (F).**

j. Bidder shall submit Declaration for Banned or delisted Tenderer/firms/Vendors as per **TEF Clause No.38** and in the format attached at **Enclosure-11**.

k. Online transfer or NEFT Receipt.

l. The scanned image of BG towards Earnest Money Deposit (EMD) / BID BOND as stipulated in **TEF Clause 9** shall be uploaded. The original of the above BG towards Earnest Money Deposit (EMD) / BID BOND shall be sent by Registered Post/Speed Post/Courier in a sealed envelope super scribing Tender Enquiry No. and Due date, so as to reach within 07 Days from the closing date of the tender during office working hours i.e. up to 1730 hrs., **addressed To**,

बिभाग प्रमुख(बाह्यस्त्रोत),
बाह्यस्त्रोत -तकनीकी सेवाएँ,
छटा मंज़िल, सर्विस ब्लॉक बिल्डिंग,
नॉर्थ यार्ड, माझगांव डॉकशिपबिल्डर्स लिमिटेड,
डॉकयार्ड रोड, मुंबई – ४०००१० (भारत)
Head of the Department (OTS),
OTS-TS Department,
6th Floor, Service Block Building,
North Yard,
Mazagon Dock Shipbuilders Limited,
Dock Yard Road, Mumbai – 400010 (INDIA)

The address label of the addressee is at Enclosure 27 on the envelope

m. Integrity Pact shall be **duly signed and stamped on all pages** and the scanned image of the **Integrity Pact (IP) as stipulated in TEF clause no. 8 and Enclosure-13 shall be uploaded** along with the Technical Bid. **The original of the Integrity Pact shall be sent by Registered Post/Speed Post/Courier in a sealed envelope** super scribing Tender Enquiry No. and Due date, so as to reach within **07 Days** from the closing date of the tender during office working hours i.e. up to 1730 hrs, to the above address.

n. Scanned copy of Bank details for payment by NEFT/RTGS/ECS with authenticated by the Banker in the format attached at **Enclosure-14**.

o. Bidders shall upload scanned copy of Solvency certificate for at least **Rs 120 Lakhs**, The Solvency Certificate should not be older than One Year as on the Tender date. It should be issued by a Scheduled Commercial (i.e. Indian or Foreign Banks included in the Second Schedule of Reserve Bank of India Act, 1934 excluding Co-operative banks or Regional Rural Banks). The Bank

Guarantee shall be from banks as per list approved by SBI Bank published on MDL website

p. Scanned copy of **GST Registration Certificate & Permanent Account Number (PAN)**.

q. Bidder should have valid ESIC code as per ESIC act and PF code- Bidder should have valid registration with Employees Provident Fund Organization under 'EPF and Miscellaneous Provisions Act, 1952'

r. Scanned copy of Valid Bidder's Shop & Establishment Registration Certificate or Certification of Incorporation from Registrar of Companies or registration certificate from Registrar of firms.

s. In case of Bidder registered with Mazagon Dock Shipbuilders Limited **may upload scanned copy** of Valid Registration Certificate issued by MDL, for the items/services for which the offer is being submitted.

t. Power of Attorney, in case of a Limited or Private Limited Company or a corporation.

u. CHECKLIST OF SUBMITTALS attached along with online Technical Bid as per format at **Enclosure-26**.

v. Declaration in respect of Conflict of Interest among Bidders/Agents- **Enclosure-29** to be filled and submitted duly signed and stamped.

w. Signed copy of Corrigendum if issued by MDL.

x. Submission of Document with reference to TEF 7.2.7.b, related to Working Capital as on 31 Mar' 2024, duly signed & stamped by Chartered Accountant.

Notes:

i) MDL has a right to verify / cross verification of authenticity of the scanned documents with respect to original submitted against this tender.

ii) The bidder is requested to **ensure that all the documents asked for are submitted** and are clear, legible & duly signed (i.e. self-attested), as it would save considerable time without necessitating the need for furnishing of the documents again by them**.** The bidder is also requested **not to submit unnecessary documents not asked for, like signed & stamped copy of this Tender document, etc.**

iii) Bidders are requested to ensure that only relevant documents complete in all respect as indicated in the tender should be attached with their offer. The first page of every uploaded set of scanned document shall be with an index of its contents. In case the offers received against this tender are more than 20, no opportunity will be extended for submission of deficient documents after opening of bids. The evaluation of the offers will be carried out and bidders will be qualified based on the documents received along with their offer.

iv) MDL reserves the right to seek clarification/ deficient documents from all the bidders quoted against the tender if number of the techno-commercially qualified bids are less than X+5 where X is the number of order proposed to be placed.

v) The bidder is required to compulsorily select "ACCEPTED" or "DEVIATION" from the choices available against the relevant Para no. /Clause no. of TEF/GCC (as applicable). In case "DEVIATION" is selected against a particular Para no. /Clause no., it would be mandatory to explain the deviation proposed by the bidder in the Deviation form at **Enclosure-5**. Any deviation(s) mentioned elsewhere in the Offer/Bid, other than in the said forms, will not be considered.

5.1.2. **मूल्य हिस्सा(भाग-२) /Price Bid (Part-II):**

a. Price Bid as appearing in the format is to be filled by the bidder ONLINE ONLY.

b. The estimated rates for various items in the Bill of Quantities (BOQ) are as appearing at **Enclosure -19**.

c. The quantities of individual items in the BOQ are approximate and may vary.

d. Bidders after considering the estimated rates of individual items in the BOQ and the total estimated value, shall quote their overall percentage at par, below or above the estimated rates.

e. The percentage quoted/agreed by the Bidder shall be applied to the estimated rates of individual items in the BOQ, rounding off to two decimal places, to arrive at the order value.

f. The Lowest Bidder (L1) shall be evaluated based on the overall cost quoted by the bidder including applicable Goods & Service Tax.

g. However, Purchase Preference in line with **Clause No 40.2** shall be given to Class I Local Supplier.

h. If a firm quotes NIL charges/consideration, the bid shall be treated as unresponsive and will not be considered.

i. The Bidder should fill in rates and prices for all items of the works described in price schedule. Items for which no rate or price is entered by the Bidder will not be paid for by MDL when executed and shall be deemed covered by the other rates and prices in the price schedule.

6. बोलियाँ में संशोधन /MODIFICATION TO THE BIDS :

6.1. Bidders desirous of modifying their bids prior to the closing date & time may do so online in the e-Procurement Portal **https://eprocuremdl.nic.in** prior to the tender closing date & time.

7. पुर्व योग्यता मापदंड/ PRE-QUALIFICATION CRITERIA:

7.1. **Technical PQC**

7.1.1. Particular experience-निविदा जारी दिनांक के पूर्व माह के अंतिम दिवस के समाप्ती तक पीछले सात वर्षो के दौरान समरूप कार्य के सफलतापूर्वक पूरा करने का अनुभव किसी भी निम्नलिखित के अंतर्गत होनी चाहिए:

Bidder's experience of having successfully completed similar works during last 7 years ending 31 Oct 2025 should be either of the following:

7.1.1.1. तीन समरूप संपन्न कार्य जिसकी प्रत्येक की लागत ₹ 142 लाख से कम न हो।

Three similar* completed works each costing not less than**₹ 142 Lakhs.**

OR

7.1.1.2. दो समरूप संपन्न कार्य जिसकी प्रत्येक कीलागत ₹ 177 लाख से कम न हो।

Two similar* completed works each costing not less than**₹ 177 Lakhs.**

OR

7.1.1.3. एक समरूप संपन्न कार्य जिसकी प्रत्येक कीलागत ₹ 284 लाख से कम न हो।

One similar* completed work costing not less than**₹ 284 Lakhs.**

***Similar Work:** Similar work shall mean "General electric works consisting of supply, installation, testing and commissioning of electrical systems in Residential/Commercial buildings or Industrial Workshops/ Warehouses or Railway/Metro stations or townships

In respect of the above, following shall be applicable

(i) Similar completed works referred above means each work and not all works put together. It is clarified that the work executed by the bidders for their in-house or capital use will not be considered for the purpose of bidder's experience of completion of similar works. The work executed under labour rate where input materials which are supplied by client shall not be considered as experience in similar completed works.

(ii) Successfully completed or substantially completed similar works can also be considered for above similar works. Substantial completion shall be based on 80 (eighty) per cent (value wise) or more works completed under the contract. (Note: Substantial completion should not be defined in terms of percentage completion, rather it should be based on functional consideration.)

(iii) Client certificate for 'substantial project/work/asset should contain two parts. Part-I shall 'Financial value of work done' or client certified invoice and Part-II shall contain; certificate of functional completion of project/work/asset'.

7.1.2. Documentary evidence in support of similar completed works viz., copies of Work Order(s)/Contract Agreement(s) indicating contract amount, Project/Work value, Scope of Work etc. & Work Completion Certificate(s) issued by the Client(s) indicating proper reference of the Work Order/Contract Agreement & date of Completion, duly signed & stamped with company seal shall be scanned and uploaded online. Bidder shall submit scanned copies of TDS certificate/ Copies of Certified invoices of relevant projects when/if asked for by MDL during tendering period.

7.1.3. **General Construction Experience**:
The bidder should have achieved an annual turnover of general electrical works of at least **Rs 354 Lakhs** in any of the year over a period of 07years, ending 31st March 2024. Further out of the above annual turnover in the relevant year, the bidder should have achieved at least Rs **177** Lakh from Electrical works. Bidder has to submit a certificate from their Chartered Accountant for the above.

7.2. **Commercial PQC**

7.2.1. Submission of requisite Instrument in support of Bid Security viz. EMD/Proof of EMD Exemption.
7.2.2. Submission of Valid Bidder's Shop & Establishment Registration Certificate or Certification of Incorporation from Registrar of Companies or registration certificate from registrar of firms.
7.2.3. Submission of Integrity Pact.
7.2.4. Submission of Solvency certificate.
7.2.5. Submission of Available Bid Capacity equal to or more than **Rs. 354 Lakh**.

The Available Bid Capacity of the Bidder should be equal to or more than **Rs. 354 Lakh** The Available Bid Capacity shall be calculated as under:

Available Bid Capacity = [1.5xAxN]-B, where

i. A = Maximum value of engineering (Civil/ Electrical/ Mechanical as relevant to work being procured) works executed in any one year during the last five years (updated at the current price level by applying a weightage of 7% per annum), taking into account the completed as well as works in progress. Value of engineering works executed during last five years shall be certified by Chartered Accountant and shall be considered for evaluation.
ii. N = Number of years prescribed for completion of work for which bids have been invited = **2 years.**
iii. B = Value (updated at the current price level) of the existing commitments and ongoing works to be completed in the next 'N' years. This statement should be submitted duly verified by Chartered Accountant.

Note: - The yield rate of GoI bonds as on the closing date of the tender shall be considered as discounting factor for updation of the value of "B".

7.2.6. The Bidder shall submit the details as required in **clause 7.2.5** above in proforma at **Enclosure- 6 & 7.**

7.2.7. Financial Capabilities

a. Bidder's average Audited Annual financial turnover during last 3 years ending 31st March 2024 should be at least **Rs.106 Lakhs.** as per the annual report or audited balance sheet and profit and loss account of the relevant period, duly authenticated by a Charted Accountant/ Cost Accountant.

b. The bidder should have access to, or possess available liquid assets and other financial means (independent of any contractual advance payments) sufficient to meet the construction cash flow requirements for the subject contract, of the certain minimum amount specified. The bidder should have adequate sources of finance to meet the cash flow requirements of works currently in progress and for future contract commitments. In support of the above, the bidder should have positive Working capital as on 31st March 2024.

7.3. **Clarification of Bids/Shortfall documents:**

7.3.1. During evaluation and comparison of bids, MDL may, at its discretion, ask the bidder for clarifications on the bid. The request for clarification shall be given in writing, asking the bidder to respond by a specified date & time.

7.3.2. If the bidder does not comply or respond by the said date, his offer will be liable to be rejected.

7.3.3. Post-bid clarification at the initiative of the bidder shall not be entertained.

7.4. In case Projects submitted by the firm is carried out for a Project where the firm has formed Joint Venture/Consortium, the share of the firm in the Joint Venture/Consortium shall be considered for turnover/prior experience.

7.5. Bids from Joint Venture / Consortium are not acceptable.

7.6. MSE shall not be given any relaxation in prior turnover and prior experience.

7.7. Start-ups recognized by DPIIT shall be given 100% relaxation in prior turnover and prior experience subject to meeting of quality & technical specifications, wherever applicable. If L-1 bidder is Start-up, then Start-up firms are eligible for ordering of 100% of tendered quantity. Note: The above provisions are subject to meeting purchase preference policies which will prevail over above provision.

7.7.1. If L-1 bidder is Start-up, then Start-up firms are eligible for ordering of 60% of limiting value. However, an initial order for 20% of 60% shall be released to monitor performance & subsequently upon successful execution order for balance 80% of 60% quantity shall be placed. And L2 bidder are eligible for Ordering of 40% of limiting value provided L2 bidder match with L1 bidder rate.

7.7.2. If L-2 bidder is Start-up, then Start-up firms are eligible for ordering of 40% of limiting value if they will match L-1 rate. However, an initial order for 20% of 40% shall be released to monitor performance & subsequently upon successful execution order for balance 80% of 40% quantity shall be placed. And L1- bidder are eligible for Ordering of 60% of limiting value.

Note: **MDL reserves the right to demand hard copy(s) of any of the above documents along with originals to verify / cause verification of authenticity of the same, whenever felt necessary.**

8. स्थल मुआयना /SITE VISIT:

8.1. The site for the work is located in MDL premises, Mumbai.

8.2. **It is considered necessary that the Bidder(s) shall visit the site and get clear idea about the work involved, before quoting. The Bidder(s) are therefore advised to visit the site and study all the particulars of the site and the nature of the work.**

Bidder(s), if required, may contact on telephone no. 022 2376 3410/ 3312 or email: **nshaikh@mazdock.com** for any doubts /clarifications / site visits.

9. बयाना राशि/ बोली प्रतिज्ञापत्र /EARNEST MONEY DEPOSIT (EMD) / BID BOND:

9.1. Bidders shall furnish EMD of **7.10 Lakhs (Rupees Seven Lakhs Ten Thousand Only),** against this tender.

9.2. EMD can be paid online through the link mazagondock.in/onlinepayment.aspx Or following the steps listed below:

- Go to www.mazgondock.in
- Click on Online Payment Tab available on the home page
- Click on the Tender Tab.
- Make the payment online using Debit Cards, Credit cards, Net Banking, BHIM/UPI etc. after filling the required details.

9.3. The EMD can also be remitted directly to MDL Bank Account as per details given below:

Beneficiary's Name	Mazagon Dock Shipbuilders Limited
Name of Bank	State Bank of India
Branch	Mazagon Br.
Branch Code	9054
Bank Address	Mazagon Branch, Mazagaon, Mumbai – 400 010
Telephone No. of Bank	23752802
Account No	10005255246
Account Type	Current Account
IFSC Code	SBIN0009054
MICR / NECS Code	400002120
Income Tax PAN No.	AAACM8029J
Income Tax TAN No.	MUMM02076E

9.4. In case bidders pay EMD online or remit the same directly to MDL Bank account through NEFT, they should specifically mention the details of company name as well as nature of remittance, tender number/order number etc. in the text/narration fields of Bank's NEFT remittance in order to identify the same. The format at **Enclosure-12** is required to be filled up by the bidder and scanned copy of the same is to be uploaded along with Techno-commercial bid (Part-I).

9.5. EMD can also be submitted in the form of Bank Guarantee in the prescribed format at **Enclosure-15**. The Bank Guarantee (Including E-Bank Guarantee) should be valid for the offer validity period indicated in the Tender plus minimum one month as claim period and should be drawn from any of the banks from the list of Banks issued by a Scheduled Commercial (i.e. Indian or Foreign Banks included in the Second Schedule of Reserve Bank of India Act, 1934 excluding Co-operative banks or Regional Rural Banks). The Bank Guarantee shall be kept valid till validity

period of the offer plus 30 days. The original of the scanned copy of EMD (BG) should reach HOD (C)/ Dealing Executive within seven days of the tender closing date.

9.6. The Bank Guarantee shall be from banks as per list approved by SBI Bank published on MDL website

Bidders submitting EMD by way of Bank Guarantee are requested to inform their issuing Bank to provide complete details viz., address, telephone / fax number(s) and e-mail id on their cover letter enclosing the BG.

9.7. The Scanned Copy of the Bank Guarantee towards EMD shall be uploaded in the Techno-commercial bid (Part-I).

9.8. Bidder shall send the original of the Bank Guarantee towards Earnest Money Deposit (EMD) by Registered Post/Speed Post/Courier/In Person so as to reach the designated addressee within **07 Working Days** from the closing date of the tender during office working hours i.e. up to 1730 hrs. Timely submission of the original EMD instrument is the responsibility of the bidders and no reasons / excuses in this regard will be entertained by MDL. The Address Label of the Designated Addressee is at **Enclosure-27**

9.9. **Alternatively, bidder can submit the EMD in the form of ISB (Insurance Surety Bond) issued by an Indian Insurance company as defined in Section 2(7A) of the Insurance Act, 1938 and the Insurer should also be registered under the Insurance Act,1938 to transact the business of general insurance and also registered with the IRDAI. The bond shall be irrevocable and unconditional. The Format for the ISB for EMD is attached at Enclosure-30.**

9.10. **If the original of EMD instrument is NOT RECEIVED within the stipulated period of 07 Days from the closing date of the tender, the Bids / Offers will be liable for rejection.**

9.11. Refund of EMD in all the cases shall be without interest as stated below:

i. EMD will be refunded to the **techno-commercially** rejected bidders within 15 days from the date of price bid opening and remaining bidders within 30 days of determination of L1 or placement of Order on Successful bidder whichever is earlier.
ii. In the event of cancellation of tender, the EMD will be refunded / returned to all the bidders
iii. EMD of successful bidders may be converted into performance security or refunded on receipt of performance security B.G.
iv. If the validity of the offer of the firm has expired and if bidder is not willing to extend the validity of offer, the EMD of such bidders to be refunded.

9.12. The Earnest Money Deposit shall be forfeited by MDL in the following events:

9.12.1. If the bidder withdraws, amends, impairs or derogates from the tender, agreed conditions of Technical Negotiation Committee/Commercial Negotiation Committee /Price Negotiation Committee in any respect within the period of validity of his offer.

9.12.2. If the successful bidder declines acceptance of order.

9.13. **बयाना राशि जमा करने से छूट/बोली प्रतिज्ञापत्र / EXEMPTION FROM SUBMISSION OF EMD/BID BOND:**

9.13.1. State & Central Government of India Departments & Public Sector Undertakings.

9.13.2. Firms registered with MDL. To qualify for EMD exemption, firms should necessarily submit valid copy of the Registration Certificate issued by MDL under materials group 9990009 for the items for which the offer is being submitted, in Part-I offer/bid. Firms in the process of obtaining MDL registration will not be considered for EMD exemption.

9.13.3. Common/Deemed DPSU registered vendors qualify for EMD exemption. Such firms shall submit valid copy of the registration certificate issued by DPSUs (other than MDL) for the items/services for which the offer is being submitted in Part-I offer/bid. Firms in process of obtaining registration in other DPSUs will not be considered for EMD exemption.

9.13.4. Start-ups as recognized by Department of Industrial Policy and Promotion (DIPP).

9.13.5. Green Channel Status vendors qualify for EMD exemption. Such firms shall submit valid copy of the Green channel certificate issued by MoD for the items for which the offer is being submitted in Part-I offer/bid. Firms in process of obtaining this certificate will not be considered for EMD exemption.

Note: <u>The procurement being of works, EMD exemption is not applicable for MSE bidder</u>

10. <u>अखंड्ता सम्झौता / INTEGRITY PACT:</u>

10.1. The Pact essentially envisages an agreement between the prospective vendors / bidders and MDL committing the persons / officials of both the parties, not to exercise any corrupt influence on any aspect of the contract.

10.2. Only **those vendors / bidders who enter into such an Integrity Pact with MDL would be competent to participate in the bidding**.

10.3. The Integrity Pact would be effective from the stage of invitation of bids till the complete execution of the contract. This pact begins when both parties have signed it. It expires for the Contractor **12 months** after the last payment under the contract and for all other bidders, **06** months after the contract has been awarded.

10.4. Integrity Pact shall be **duly signed and stamped on all pages**. Bidders shall upload the signed Integrity Pact, as per format enclosed at **Enclosure-13** in the online Techno-Commercial Bid (Part-I). The hard copy of the **`INTEGRITY PACT' shall be submitted in the office of Outsourcing (OTS) Department, 6th floor Service Block Bldg., NY, Mazagon Dock Shipbuilders Limited within 07 Days after closing of the tender.**

10.5. The Integrity Pact would be signed by the Competent Authority in MDL & a copy returned to the bidder.

10.6. MDL has appointed **Independent External Monitors (IEMs),** who will monitor the tender process and the execution of the contract, for compliance with all relevant laws, rules, regulations, economic use of resources and for fairness / transparency in its relations with its Bidder(s) and /or Contractor(s). The names and complete address with contact details of the IEMs are displayed on MDL's website **<u>www.mazagondock.in</u>**

11. <u>वैधता अवधि /VALIDITY PERIOD:</u>

11.1 Bids / Offers shall remain valid for a period of not less than **120 Days** after the deadline date of submission.

11.2 Techno-Commercially accepted bidder shall be given opportunity to accept validity as per the tender in case of shorter validity quoted by him. Non-acceptance thereafter the bid shall be rejected by MDL as non-responsive.

11.3 In exceptional circumstances, prior to expiry of the original validity of offer(s), the bidders will be requested to extend the period of offer validity for a specified additional period. The request and the bidder's responses shall be made in writing. If the bidder does not accept the request of MDL for extension of validity, the bid security will not be forfeited. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his bid security. In case techno-commercially accepted bidder/s does not agree to extend the offer validity, the offers of all techno- commercially accepted bidder/s including the bidder who has not agreed to extend their offer validity, shall be opened and proceed further with valid bids. If the bidder who has not agreed to extend their offer validity found to be L1 then his price shall be used as reference price for negotiation purpose as applicable.

12. निविदाएँ खोलने की प्रक्रिया /OPENING OF BIDS:

12.1. **Part-I (Techno-commercial Bid): Part-I bid will be opened online on the due tender** opening date from 14:30 Hrs onwards in OTS-TS Section, OTS-Dept. The bidder can view the tender online by logging their user ID on the portal **https://eprocuremdl.nic.in**

12.2. **Part-II (Price Bid):** After completion of Techno-Commercial scrutiny, intimation for opening of Part-II bid will be communicated only to Techno-Commercially accepted bidders. Such intimation may be given at a short notice by Fax, E-mail or even by telephone, only to the Techno-Commercially qualified bidder(s). The bidders can view the price bids online from their location by logging on to the portal **https://eprocuremdl.nic.in** with their Class-III B digital signature certificate.

13. बोलियों का मुल्याकन/EVALUATION OF BIDS:

13.1. The Bidders should meet the criteria as stipulated in "Prequalification criteria" and submit all documents as stipulated in Clause "Techno-Commercial (Part-I) Bid"
13.2. The Price bid of only Techno-Commercially qualified bidders shall be opened.
13.3. The comparison of the responsive tenders shall be on **total outgo on Least Cost Net of Credit Basis (LCNC)**, for the procurement to be paid to the Contractor or the Service provider, including all elements of costs, duties, levies, freight, insurance etc. excluding GST (where ITC is available).
13.4. The applicable loading towards deviations shall be loaded for ranking purpose.
13.5. Discount given, if any, by the bidders, after the last date for submission of the bids but before opening of the price bids, will not be considered for determining the ranking of bids but will have to be considered after the said bidder is adjudged as L1.
13.6. Instances of multiple L1s: In cases where multiple bidders emerge as L1, 50:50 Qty to be given to each.
13.7. Negotiations will be done with L1 bidder.
13.8. However, Purchase Preference in line with PUBLIC PROCUREMENT POLICY (Preference to Make in India) ORDER 2017 shall be extended to Class I Local Supplier. Order shall be placed accordingly on offered/negotiated price with such Class I Local Supplier, if the offered/negotiated price is acceptable to MDL
13.9. In case Purchase Preference is not applicable, the Order shall be placed on Lowest bidder (L1) in case the offered/negotiated price of L1 bidder is acceptable to MDL.
13.10. **PARALLEL RATE CONTRACT:**

13.10.1. MDL reserves the right to award Parallel Rate Contracts to one or more Bidders depending upon the urgency of the requirements as per the following general guidelines:

a) L1 Bidder – 60% of the limiting value expected during the tenure of the Rate Contract.
b) L2 Bidder – 40% of the limiting value expected during the tenure of the Rate Contract.
c) L2 bidder will be offered to match the quoted/negotiated price of L1 bidder before award of parallel contract. Parallel Rate Contract to the L2 bidder, as per the above ratio, shall be awarded only if L2 agrees to match the quoted /negotiated price of L1 in totality.

13.10.2. In case L2 bidder decline to match the quoted/negotiated rate(s) of the L1 bidder, the other technically qualified bidder(s) viz., L3, L4 etc. will be offered to match L1's rate(s).

13.10.3. The award of further work to a contractor shall be based on the satisfactory performance and timely completion of the allotted work.

13.10.4. If L2, L3 etc do not agree to match the L1 price for the remaining part of the work (i.e., other than that allotted to L1 bidder), the remaining part of eork shall be retendered and L1 bidder shall not be allowed to participate in retendering.

14. बोली अस्वीकृति करनेकी मापदंड /BID REJECTION CRITERIA:

14.1. The Following conditions/ deviations are non- negotiable and therefore any bid falling under these conditions/ deviations shall be **summarily rejected**. Bidders to note that they shall not be provided any opportunity to rectify these conditions/ deviations post bid opening:-

14.1.1. Bids received after tender closing date and time.
14.1.2. Bids received other than through e-portal.
14.1.3. Bidders who are debarred under Public Procurement Policy (PPP) Make In India MII) order 2017, GeM, CPPP including Tender holiday issued by MDL.
14.1.4. Bids received without EMD (other than those who are exempted from payment of EMD or those submitting valid EMD Exemption document).

14.2. Non-compliance/non-acceptance to any of the terms and conditions of the tender shall render the bid liable for rejection;

Equal time and opportunity for submission of deficient techno-commercial documents and clarification shall be given to the bidders subject to **TEF clause no:5.1-ii-Note-s. no. iii & iv**. Bidders are required to submit such documents / clarifications within the duration / date stipulated by MDL failing which their bids are liable for rejection.

14.3. DISQUALIFICATION:

Even if a bidder meets the tender terms and conditions including prequalification criteria, bidder shall be subject to disqualification if he is found to have:

(a) Made misleading or false representations in the forms, statements, affidavits and attachments submitted in proof of the qualification requirements; and/ or;
(b) On account of currency of debarment by MDL.

15. बेसलाईन शेड्यूल और प्रभावित शेड्यूल /Baseline Schedule and Impacted Schedule

15.1. **Baseline Schedule and Impacted Schedule:**

(i) The Contractor to submit Baseline Schedule in MS Project, duly approved by EIC, before commencement of Project. In case of additional work, revised schedule to be submitted by the Contractor.
(ii) Extension of Time Period shall be considered for delays not attributable to the Contractor only for the activities identified in the baseline schedule/ revised

schedule. No Extension to the Contract shall be considered in case of failure of submission of Baseline Schedule and Impacted Schedule.

(iii) Construction Drawings for any activity identified in the baseline schedule will be issued 60 days prior to start date of that activity.

(iv) Contractor shall notify the MDL in writing at least 15 days in advance for any drawings/ sketches/ detailing required during execution of the work at site.

16. दर अनुबंध की अवधि /Period of Rate Contract:

16.1. The successful bidder shall have to carry out the dredging work(s) at the quoted / accepted rates for a period of **TWO YEARS** from the date of Rate Contract Order. The contract may be extendable for a period of ONE YEAR with the same rates, terms and conditions, if the Contractor's services are found satisfactory.

16.2. This Rate Contract will only be an agreement between MDL and the Contractor to provide services at specified prices during the period covered by the contract. While the Contractor is to execute any dredging work during the currency of the contract at the agreed rates, it should be realized that the Rate Contract is just a standing order and will come into effect only when a separate Purchase Order for any specific work is placed.

16.3. Separate Purchase Order for specific work to be carried out under this Rate Contract will be issued by MDL from time to time as per the requirements. The Purchase Orders may be placed up to the last date of the currency of the Rate Contract but not after the expiry of the Rate Contract. However, the contractual conditions for Completion Schedule, Retention Money, Performance Bank Guarantee, Insurance, etc. will be as specified in the individual Purchase Order which may extend beyond the period of the Rate Contract.

16.4. The Rate Contract will remain in force for the purpose of completion of all works ordered during the currency of the Rate Contract until they have been completed.

17. लामबंधी /MOBILIZATION:

17.1 The Contractor shall deploy his manpower, material & machinery within 21 (Twenty-One) days from Placement of Rate Contract and 15 days from placement of Confirmatory Order.

18. मूल्य निर्धारण /PRICING:

18.1 All materials shall be procured by the contractor as specified in the Technical Specification/Bill of Quantities, at his own cost and the price quoted shall be deemed to be inclusive of all applicable taxes, transportation, storage, royalties, handling, etc. The contractor should produce challans / Invoices of the materials and its quantity brought to the site as and when required by MDL.

19. कर और शुल्क /TAXES AND DUTIES:

19.1. GST as per GST Laws shall be payable extra as quoted and agreed.

19.2. In case of purchases of goods/services from unregistered dealers under GST Laws, GST will be paid by MDL under reverse charge mechanism.

19.3. Benefits from reduction in rate of tax/ITC are required to be passed on to consumer. Where "applicable GST" has been quoted as extra, Goods and service providers (except un-registered dealers under GST Law) have to submit declaration that they have complied with 'Anti-profiteering clause' under GST Law. Such declaration be given in technical bid.

19.4. If the vendor is registered under GST, vendor shall mention the HSN code for goods &/or SAC for services in their tax invoice, etc. These codes must be in accordance with GST Laws and responsibility of specifying correct HSN codes for goods &/or SAC for services is that of the vendor. MDL shall not be responsible for any error in HSN code for goods &/or SAC for services specified by supplier / contractor. Supplier /Contractor shall pay penalty and/ or interest imposed on MDL or any loss due to delay in availing ITC by MDL or any loss of ITC to MDL due to errors by vendors at any stage. MDL reserves right to recover any such interest, penalty or loss from any amount due to Supplier /Contractor or otherwise.

19.5. In case, MDL is unable to avail ITC, supplier/contractor at their own cost shall rectify the shortcoming in the returns to be filed immediately thereafter. Further, if the ITC is delayed / denied to MDL / reversed subsequently as per GST Laws due to non / delayed receipt of goods and / or services and / or tax invoice or expiry of timelines prescribed in GST Laws for availing ITC, non-payment of taxes or non-filing of returns or any other reason not attributable to MDL, Supplier /Contractor shall pay any loss of amount along with interest and penalty on MDL under GST Laws for the number of days the ITC was delayed. If the short coming is not rectified by supplier/contractor and MDL ends up in reversal of credits and / or payments, supplier /contractor is fully liable for making good all the loss incurred by MDL. MDL reserves right to recover any interest, penalty or loss from any amount due to Supplier /Contractor or otherwise.

19.6. If the vendor is registered under GST, the GST registration number (15 digit GSTIN) issued by GOI shall be mandatorily provided by the vendor. Vendor having multiple business verticals within state / at multiple states with separate GST registration numbers shall forward GSTIN of only that vertical which is involved in supply of goods and/or services. MDL GSTIN is **27AAACM8029J1ZA** and vendor shall mention the same while invoicing and avoid any data entry error on GST portal.

19.7. If the vendor is registered under GST, Vendor shall ensure timely submission of invoice as per the provisions / requirement / timeline promulgated by GOI in relation to GST Law with all required supporting documents to enable MDL to avail input tax credit promptly. The vendors invoice inter alia should contain GSTIN of vendor, GSTIN of MDL (i.e. **27AAACM8029J1ZA**), GST tax rate separately, HSN code wise goods or services, place of supply, signature of vendor, etc. Original invoice needs to be submitted to Bill Receipt Centre at MDL gate, and a copy of the invoice should be given to the goods receiving section (GRS).

19.8. If the vendor is registered under GST, vendor shall file all applicable returns under GST Laws in the stipulated time & any losses of tax credit to MDL arising due to delay in filing will be recovered from their invoice wherever MDL is eligible to avail tax credit. Any default towards payment of tax and / or uploading of monthly returns by supplier/contractor, MDL retains right to withhold payments towards tax portion until the same is corrected & complied by the supplier/contractor with the requirement of GST along with satisfactory evidence.

19.9. The rate sheet enclosed with the tender will indicate the rates to be entered under each head wherever applicable. Bidders must clearly mention the applicable Taxes & Duties unless otherwise stated in tender. The item-wise rates (i.e. Basic +P&F+F&I) quoted in the Rate Sheet should exclude Taxes & Duties. Bidder should indicate GST rates as applicable separately under each of the head in the same Rate sheet, which will be paid extra based on tax invoice to the extent applicable. The GST will be applicable on total basic rate of each item (i.e. Basic + P&F + F&I).

19.10. **Stamp Duty:** It shall be incumbent on the Contractor to pay Stamp duty on the contract. As per the provision made in article 63, Schedule-I, read with section 30, of the Maharashtra

Stamp Act (Bombay Act LX of 1958), Stamp duty is payable by the Contractor for "works contract" that is to say, a contract for works and labour or services involving transfer of property in goods (whether as goods or in some other form) in its executions and includes a sub-contract, as under:

Contract Value	Stamp Duty
a. Where the amount or value said forth in work contract does not exceed ₹10 Lakhs.	₹500.00
b. Where it exceeds ₹10 Lakhs	*₹500.00 +0.1% of the amount above ten lakhs subject to maximum of ₹ Rs 25 lakhs.*

Note: The Stamp Duty is applicable on Base value excluding GST.

19.11. Bidder(s) will not be entitled to any increase in rate of taxes occurring during the period of extended delivery schedule, if there is delay in supply / completion attributed to him. However, if there is a decrease in taxes, the same must be passed on to MDL.

19.12. Wherever all-inclusive prices are quoted by the Bidder(s) without bifurcation of tax elements, no Price Variation can be considered in respect of any variations in statutory levies arising subsequently because of the absence of the required base figures in the purchase order / contract.

19.13. Taxes and other levies shall be deducted at source, wherever applicable, from the invoices of the Contractor/Bidder as per statutes.

19.14. Any increase/decrease in taxes, duties & levies or introduction of new taxes due to change in the legislation shall be subject to adjustment During currency of the original contract period.

19.15. **LABOUR CESS:** Deduction towards Labour Cess shall be made from invoices of contractor in line with 'Building & Other Construction Workers (BOCW) Act,1996.
The Contractors who are having 20 or more workers have to be registered under BOCW (RE& CS) Act,1996. The Contractor shall ensure compliance of the same, if applicable to them.

20. भुगतान की शर्तें /TERMS OF PAYMENT:

20.1. MDL payment terms shall be as under:

i. The payment for work done after reducing any deductibles and/or the amount leviable towards liquidated damages, if any and after including statutory taxes, duties and levies as applicable will be made through RTGS/NEFT/ECS as per the actual quantities of the work executed by way of running account invoices per item basis (R. A.) Preferably as on monthly basis.

ii. The invoices must be submitted in four copies **(1-Original + 3 copies)** along with the joint measurements taken at site duly approved by the designated representatives of the Technical Services department.

iii. The payment against invoices will be made within 15 days of its receipt in MDL provided submission of invoice in totality along with all the necessary documents as under:

a. Invoice Certification as per **Enclosure-24,**
b. Joint Measurement sheets duly signed & stamped by MDL,

c. Soft copy of Joint Measurement sheets
d. SAP generated work completion certificate indicating deduction if any duly signed & stamped by MDL
e. Copy(s) of invoices of materials,
f. Vendor's self-Declaration (Refer **Clause 20.1.viii**) wherever applicable,
g. Certification of Disposal of Scrap/ Debris as per **Enclosure-28**

iv. Before submission of the final bill, the Contractor should sign and submit the following:
a. Actual Local Content Certificate as per **Enclosure-10 (C)**
b. A "No Claim Certificate" indicating that he has no claim against the company under the contract except as included in the final bill.
c. Taking over certificate issued by Engineer In charge, MDL

v. On request from Contractor, ad-hoc payments of not less than 75 % of eligible running account bill/due stage payment, shall be made within 10 working days of the submission of complete bill along with all applicable documents. The remaining payment is also to be made after final checking of the bill within 28 working days of submission of complete bill along with all applicable documents by the contractor.

vi. For Items where Basic Rates of Items are specified in The Contract:
a. The Contractor must necessarily submit copy(s) of challan and invoice of all such materials used in the works immediately on receipt of the materials in MDL. In case, the basic rate of the material procured is less than that indicated against the respective item, the difference in the amount of basic rate of the material procured and the Basic Price indicated in the respective item in the Contract shall be deducted from the invoices.
b. In case, MDL specifically desires to adopt certain material in lieu of the material mentioned in the item in Bill of Quantities wherein the basic rate is indicated, the difference in the amount of basic rate of the material to be procured and the Basic Price indicated in the respective item in the Contract shall be paid extra over and above the quoted/ negotiated price of the item provided that MDL conveys it in writing before execution of said item. In such cases, the Contractor must necessarily submit copy(s) of challan and invoice of all such materials used in the works immediately on receipt of the materials in MDL.

vii. **Electronic Invoicing System (EIS):** In any preceding financial year from 2017-18 onwards Contractor whose turnover is more than **₹ 5 Crores** on award of Purchase order, need to issue E invoice to MDL, which has an Invoice Registration Number (IRN) and a Quick Response (QR) code. An invoice without an IRN and QR code will be treated as an invalid invoice and MDL will not be entitled for Input Tax Credit (ITC)/ GST on a vendor Invoice which is not compliant with the above invoice notification.

viii. **Vendor's self-declaration:** Wherever GST is applicable, payment will be released against **e-Invoice** (refer **TEF Clause No. 20.1.vii**) or Invoice accompanied with **Vendor's self-declaration** stating that " **we do not fall under the category of registered persons notified under Rule 48(4) of the Central GST Rules, 2017 and we are not required to comply with the e-Invoicing provisions under GST Act, as our aggregate turnover in any preceding financial year from 2017-18 onwards has not exceeded ₹ 5 Crore as per GST Act**"

ix. **Alternate MSME vendor payment through TReDS:**

In order to address the financial needs of MSME firms, GoI has introduced a platform for facilitating the financing of trade receivables of MSMEs from buyers, through multiple financiers which is termed as Trade Receivables Discounting System (TReDS). At TReDS, auctioning of invoices at competitive & transparent environment is done by financers based on Buyer's credit profile.

MDL is registered on the "Invoicemart" TReDS platform and M1xchange of M/s Mynd Solutions Pvt. Ltd. Further, MDL has entered into an agreement with M/s.Receivables Exchange of Indica Limited (RXIL) for registration on TreDs platform. As a special gesture, all the above three discounting platforms i.e M/s.RXIL, Invoice Mart and M1Exchange have offered waiver of registration / on boarding fees to MDL Vendors MSME bidders desirous to receive payments through TReDS platform may avail the facility if they are already registered on

1."Invoicemart" TReDS platform or by registering on it.
Contact details at "Invoicemart" TReDS platform are as below:
022 6235 7373 and a new mail id service@invoicemart.com.

2. "M1xchange" TReDS platform or by registering on it.
Contact details at "M1xchange" TReDS platform are as below:
+91 9920455374 Ms. Ashwathi Jayandran
email id ashwathi.jayandran@m1xchange.com
+91 8839915724 Ms. Prinyaka Shah Email id prinyaka.shah@m1xchange.com

21. वृद्धि/PRICE VARIATION:

The formula for Price Variation is as below:

$P_a = P_O \times [(0.15 + 0.68 \times (M_1/M_0) + 0.17 \times (L_1/L_0)]/100 - P_O$

Where: -

Pa is the adjustment amount payable to the supplier (a minus figure will indicate a reduction in the contract price) on the date of supply
Po is the contract price on the base date (which is taken as the date on which tender is due to open)
Lo and **L1** are the average wage indices for the quarter before the quarter in which base month falls and for the quarter before the quarter in which work done period falls; respectively. For example, for a tender opening on March 17, 2016 (base date), Lo would be average wage index for the quarter of Oct-Dec 2015. Consumer Price Index for Industrial Labour (All India) declared by Labour Bureau, Govt. of India as applicable for the period under consideration and that valid at the time of receipt of tenders, respectively.
Mo and **M1** are the material prices/indices as average of the month, two month prior to the month in which base month falls and average of the month, two month prior to the month in which work done period falls, respectively. For example, for a tender opening on March 17, 2016 (base date), Mo would be prices/index as average of the month of January 2016. All material prices/indices will be basic prices without excise duty and without any other central, state, local taxes and duties and Octroi All India Wholesale Price Index for All Commodities or any specific material (to be indicated in tender), for the period under reckoning as published by the Economic Advisor to Government of India, Ministry of Industry and Commerce, for the period under consideration and that valid at the time of receipt of tender, respectively.

If more than one major item of material is involved, the material element can be broken up into two or three components such as Mx, My, Mz.

The formula has been derived considering 15% fixed elements and profits, 68% Material and 17% Labour.

The following conditions would be applicable to price adjustment:

- Base dates shall be due dates of opening of bids (technical bid in two or three envelop/cover system)
- The period of work done shall be the date of calculation/determination of the price variation.
- No price increase is allowed beyond original delivery period.
- No price adjustment shall be payable on the portion of contract price paid to the Contractor as an advance/interim payment after the date of such payment
- Payments for each supply would initially be made as per the base price mentioned in the contract. Price adjustment bill should be submitted only quarterly for the supplies made during the quarter.
- Even if there is no price adjustment claim, supplier must submit all relevant data to prove that there is no downward variation. In any case he must submit a declaration as follows;
  "It is certified that there has been no decrease in the price of price variation indices and in the event of any decrease of such indices during the currency of this contract we shall promptly notify the same to the purchaser and offer requisite reduction in the contract rate".

22. परिनिर्धारित हर्जाना /LIQUIDATED DAMAGES:

22.1. Time is the essence of the contract and therefore the job, as ordered, should be completed on the dates mutually agreed upon in accordance with the delivery schedule. In cases of delay not attributable to MDL beyond the agreed schedule, the Contractor shall pay liquidated damages, a sum representing 0.5% (Half percent) per week or part thereof, subject to maximum of 10% of the contract value (completed value).

22.2. If the Contractor fails to complete the works within the time or extended time as per the Order, then the contractor shall pay to MDL the sum stated above as liquidated damages for such default and not as a penalty for every day or part of a day which shall elapse between the time prescribed or extended time as the case may be and the date of completion of works. MDL may without prejudice to any other method of recovery deduct the amount of such damages from any monies in his hands due or which may become due to the contractor. The payment or deduction of such damages shall not relieve the contractor from his obligation to complete the works or from any other of his obligations and liabilities under the contract.

23. दोष दायित्व अवधि/DEFECT LIABILITY PERIOD (DLP):

23.1. The defect liability period shall be **One Year** from the date of actual completion of entire work. However, in case Part of the work has been taken over by MDL, the Defect Liability Period pertaining to that part shall commence from the date of taking over of that portion by MDL. Defect Liability Period for the balance part shall commence from the date of actual completion of entire work'.

23.2. Defect Notification Period is 15 days from the last date of Defect Liability period.

23.3. The contractor shall have to rectify any defects noticed in the work either by way of bad material or workmanship during the Defect Liability Period at no extra cost to MDL, on priority.

23.4. CLAIMS BY FIRMS: No claims by the firms will be entertained after 03 years from completion of Defect Liability Period.

24. अनुबंध निष्पादन गारंटी /CONTRACT PERFORMANCE GUARANTEE

24.1. A Performance Bank Guarantee for 2% of the Rate Contract Limiting Value excluding taxes and having validity period considering (Contract period + DLP + 06 months), shall be submitted by the Contractors as per MDL format at **Enclosure-16** within 25 days of entering into the Rate contract to take care of the works spilling beyond Contract period.

24.2. A Security Deposit for the work done shall be recovered as "Retention Money" which shall be deducted @8% of the value of work done (excluding taxes and price variation) from each RA bill of confirmatory Purchase order. The amount so retained shall be refunded to the contractor on completion of Defects Liability Period of the Confirmatory Purchase Order.

24.3. In the event of extension of Rate Contract, fresh performance Bank Guarantee to be submitted for 2% of the cumulative value of ongoing works and completed works whose DLP has not expired. The validity of the fresh BG shall be 13 months from the latest completion period of the ongoing works. On receipt of fresh BG, duly verified by Bank, the original BG shall be returned to the Contractor. Alternatively, validity of the original BG can be extended.

24.4. In case the Contractor fails to submit fresh BG or fails to extend the validity of the existing BG, the existing BG shall be encashed.

24.5. The Bank Guarantee shall be submitted by the bidders preferably in E-BG mode or through SWIFT drawn in favour of MAZAGON DOCK SHIPBUILDERS LIMITED, MUMBAI. The Bank Guarantee shall be only from the list of Banks issued by a Scheduled Commercial (i.e. Indian or Foreign Banks included in the Second Schedule of Reserve Bank of India Act, 1934 excluding Co-operative banks or Regional Rural Banks). The Issuing Bank Notified vide OM No.F.9/4/2020-PPD issued by Department of Expenditure dated 30.12.2021 should also state the name and designation of the next Higher Authority of the Officials who have issued the Bank Guarantee. Crossed DD / Pay Order issued by Co-operative banks however may be considered to be accepted and the bid would be considered accordingly.

24.6. The Bank Guarantee shall be from banks as per list approved by SBI Bank published on MDL website

Bank Guarantee from banks not mentioned in the aforesaid approved list shall NOT be accepted.

24.7. Rolling Bank Guarantee towards Performance Security can be submitted with the validity period of at least One year with a claim period of three months within which the same to be extended by the contractor for further period by Amendment.

24.8. In case of non-submission of PBG within 25 days of Placement of Purchase Order, there is likelihood of cancellation of the order.

24.9. In case of delays in submission of the Performance Bank Guarantee, the amount towards the Bank Guarantees shall be retained from the subsequent Invoice. The same shall be returned to the Contractor, without interest, on submission of the Bank Guarantee and receipt of confirmation from the bank. In such case, MDL reserves the right to charge Interest @ SBAR+2% from the firm for such period of delays.

24.10. The Performance Bank Guarantee will be returned only after expiry of the 60 Days beyond the stipulated Defect Liability Period of One years from actual completion of entire work, provided there are no pending defects for rectification, already notified to the contractor. However, in cases where rectification of defects notified are not likely to be completed by the Contractor before expiry of the DLP, the Contractor will have to extend the Performance Bank Guarantee suitably or as requested by MDL.

24.11. The BG's should contain the following:

i. The name, designation and code number of the Bank officer(s) signing the Guarantee.

ii. The address and other details (including telephone No.) of the controlling officer of the Bank issuing the BG.

24.12. In case the validity of the Bank Guarantee is on the verge of expiry and the same is not the extended /not renewed by the contractor as per order terms, MDL reserves the right to forfeit the same.

24.13. Alternatively, bidder can submit the Performance security in the form of ISB (Insurance Surety Bond) issued by an Indian Insurance company as defined in Section 2(7A) of the Insurance Act, 1938 and the Insurer should also be registered under the Insurance Act,1938 to transact the business of general insurance and also registered with the IRDAI. The bond shall be irrevocable and unconditional. The Format for the ISB for Performance Security is attached at Enclosure-31.

25. **जलरोधी गारंटी /WATERPROOFING GUARANTEE**- Not Applicable.

26. **जल रिसाव के खिलाफ बैंक गारंटी/ BANK GUARANTEE AGAINST WATER LEAKAGE-** Not Applicable.

27. बीमा / INSURANCE:

27.1. The Contractor has to keep MDL indemnified against any claims by purchasing **CONTRACTOR'S ALL RISK** insurance policy for the value of the Contract from any Insurance Company of repute.

27.2. The policy shall be obtained in the **joint names of MDL and the Contractor**, with MDL's name appearing first. The Policy should be of full value of the Contract and shall be valid till the completion of the works. Contractor shall submit the policy within 21 days from the date of placement of order or before commencement of work whichever is earlier. The Original CAR Policy shall be deposited with Engineer in Charge and copy to be submitted to HOD (OTS) and shall be extended well in time as required.

27.3. In case Contract value increases more than 10% from Original Contract value during execution of the work, the contractor shall submit the additional "**CONTRACTOR'S ALL RISK** insurance of additional contract value. No additional insurance policy is required in case the Contract value increases upto 10% of Original Contract Value or upto Rs 5 lakhs whichever is lower.

27.4. The original of policy shall be lodged with MDL.

27.5. In case Contractor fails to submit valid CAR policy of full value of contract, their workmen shall not be allowed to enter inside MDL premises/ working areas and Engineer-In-Charge may issue prior Notice for Stoppage of work.

28. ठेकेदार का दायित्व /CONTRACTOR'S OBLIGATION:

28.1. Bidder shall abide by all Terms of Tender Enquiry (TEF), General Conditions of Contract (GCC) for Civil Works and respective acceptance formats **are to be filled as appearing online in e-Techno-Commercial (Part-I) bid**. The bidder shall also abide by the statutory requirements, Official Secret Acts 1923, Safety Code and Security Procedure, which can be downloaded from www.mazagondock.in→ Tenders → Technical Services.

i. The Contractor shall pay to his employees not less than the minimum wages and other statutory obligations applicable to the Engineering Industry as notified from time to time **by the Central Government or the State Government whichever is higher** under Minimum Wages Act.
ii. The Contractor shall be responsible for timely payment of wages of all his employees engaged in the Purchaser's Yard, not less than the prescribed minimum wages in each case and without any deductions of any kind, except as specified by Government or permissible under the Payment of Wages Act.
iii. The Contractor must settle all the pending dues of the employees i.e. arrears of wages, proportionate leave wages, proportionate bonus payment, etc.
iv. Before winding up the site, the Bidder / Contractor shall pay all terminal dues to his employees such as Notice pay, Gratuity, Retrenchment compensation, etc.

28.2. **Breach of Obligation with respect to Bid submitted:** In case of breach of any obligation mentioned under, the bidder shall be disqualified / debarred from the bidding process for a period of one year from the date of notification:

i. Bidder has withdrawn / modified / amended /impaired / derogated from the tender during the period of bid validity
ii. Bidder fails or refuses to execute the contract upon notification of acceptance of bid by the Purchaser during the period of bid validity.

29. नियम और शर्तो की स्वीकृति/ACCEPTANCE OF TERMS AND CONDITION:

29.1. In case of improper on-line filling of Acceptance Formats for Tender Enquiry Form, General Conditions of Contract (GCC), it shall be presumed that all our tender terms & conditions are acceptable to bidder.

30. कार्य एवं माप का क्रियान्वयन /EXECUTION OF WORK AND MEASUREMENT:

30.1. All works shall be carried out and measured as per specifications and standard Engineering practice and mode of measurements, conforming to the relevant IS code. The Contactor shall ensure that skilled workmen in their respective trades are employed. He shall also employ qualified Engineer(s) / Supervisor(s) experienced in similar type of work, as required, for execution of work efficiently.

30.2. Request for permission for working on Saturday / Sunday / holidays if required, should be submitted 3 working days prior to the date of holiday, to Personnel department and Security through Technical Services Department.

30.3. The work is to be carried out in the area where MDL's normal activities are in progress. The Contractor has to plan his work in such a way as not to disturb the normal activities of MDL. The contractor shall not be paid for any compensation for idle period if generated due to any

reason whatsoever. Reasonable extension in time, however, may be considered on application in writing along with supporting Documents.

30.4. All the quantities indicated in the Bill of Quantities are indicative only. However, the Contractor shall be paid for the actual work carried out at site in line with the Contract terms and conditions.

30.5. All the works under or in course of execution or executed in pursuance of the contract shall at all times be open to inspection and supervision of the MDL and the Contractor at all times during the usual working hours, offer assistance for the inspection of work. Orders given to the Contractor's agent shall be considered to have the same force as if they had been given to the contractor himself.

30.6. The Contractor shall submit supporting documents such as Invoice of Materials, Delivery Challan(s), Release note from the nominated Inspection Agency, Test reports / Certificates, Packing Lists, Invoice, Performance Guarantee, Storage / Preservation / Installation / Commissioning / Maintenance Procedures & other Technical documentation in requisite sets as relevant along with the invoice for the purpose of certification by MDL.

30.7. Contractor shall submit Reconciliation Statement for Steel, Cement, Concrete and other materials along with invoice for checking/ verification by MDL Executives before certification and processing of invoice.

30.8. Contractor shall be responsible for procuring all the materials required for construction. Contractor shall arrange for testing of materials from approved laboratory and submission of test certificates as per specification in accordance with relevant IS Codes. The cost towards testing is deemed to be included in the quoted rates.

30.9. All construction materials procured by the contractor should be of approved quality and free from defects. MDL has got all the Rights to Test and Reject any material in part or in full at any point of time. MDL reserves the right to take random samples from materials delivered by the Contractor at site and send the same for testing at Govt. approved laboratory(s). Cost towards the same shall be borne by the Contractor.

30.10. The contractor shall give seven days' notice for MDL to arrange representatives for inspection at their works. Testing of samples shall be made in the presence of MDL representatives. Materials shall be delivered to MDL site only after clearance from MDL along with test certificates. MDL reserves the right to take random samples from materials delivered by the Contractor at site and send the same for testing at Govt. approved laboratory(s). Cost towards the same shall be borne by the Contractor.

30.11. Contractor shall arrange for equipment's / instruments with valid calibration certificate as required at site. The cost towards the same is deemed to be included in the quoted rates.

30.12. The Contractor shall comply with the sanitary requirements of the local Medical Health Authorities and bear the cost of any charges levied by such Authorities for the execution of work.

30.13. Availability of Construction material

During the tenure of the Contract due to the various reasons, there may be scarcity of availability of construction material in Mumbai region & this type of crises may be for short term or long term. In such circumstances, Contractor shall arrange to procure the Material available from other state/region of India with no additional cost to MDL. The cost of the same is deemed to be included in Bidder's quote.

30.14. **Special Condition of Contract.**

GENERAL GUIDELINES FOR POSTING OF TECHNICAL STAFF FOR THIS WORK AT SITE.

1. On award of work, Contractor to submit an organogram highlighting site team as well as office staff. Nevertheless, a minimum technical team staff as detailed below is required at site failing which suitable recovery shall be made.:

Sr. No.	Designation Technical Staff	Total No's	Qualifications	Minimum Experience (Years)	Duration	Rate at which recovery shall be made from the contractor in the event of not fulfilling
1	2	3	4	5	6	7
1	Project Manager cum Planning/Quality/Site/ Billing Engineer	1+1	Graduate Electrical Engineer or Diploma Electrical Engineer	02 or 05 Years respectively	Till completion of work	Rs 15,000/- Per Month.
2	Safety Officer	1	Diploma in safety	3 Years	Till completion of work	Rs. 15,000/- Per Month

31. अनुबंध की निगरानी/MONITORING OF CONTRACT:

31.1. The Contractor shall record; submit to the Engineer daily, progress report for the preceding day showing up to date progress and progress during the previous day on all items of each section of the works in relation to and in consideration of the schedule. In addition, the Contractor shall submit on the second day of every fortnight, a detailed progress report giving the progress of the works during the preceding fortnight and also indicating the up to date progress of the work.

31.2. The Contractor shall appoint the Contractor's Representative with prior written approval from the MDL and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

31.3. The Contractor shall not, without the prior consent of the MDL, revoke the appointment of the Contractor's Representative or appoint a replacement.

31.4. The Contractor's Representative shall, on behalf of the Contractor, receive instructions from MDL.

31.5. The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Purchaser has received prior notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being

delegated or revoked. The Contractor shall appoint a team of qualified persons having adequate experience in execution of such works for assisting the Contractor's Representative.

31.6. The Contractor has to co-ordinate with the other specialised agencies so working on the project so as to ensure a proper end product of the work.

32. ठेकेदार का दायरा/CONTACTOR'S SCOPE:

32.1. **Power**: Power, if available and required by the Contractor, may be supplied in single phase or three phases, at a single nearby source free of cost. The contractor shall make his own arrangement for electrical fittings, cables/wires, welding transformers, etc. at his own cost.

32.2. **Water:** Water, if available, and required by the Contractor, may be supplied by MDL free of cost. However, the contractor shall make his own arrangement for connecting lines, storage etc. at his own cost.

32.3. **Equipment/Machinery:** The contractor shall make his own arrangement for all equipment, machinery, tools and tackles etc.

32.4. **Construction Material:** All the materials required for works procured by the Contractor shall be of repute make and as approved by MDL. The rate shall be inclusive of transportation, storage, security, handling etc.

32.5. **Consumables**: All the consumables required for the works including temporary works, allied/ associated job etc. shall be procured by the Contractor including transportation, storage, security, handling etc.

33. अतिरिक्त कार्य /EXTRA ITEMS/VARIATION IN QUANTITY:

33.1. Extra items of works, if any, shall be determined supported by a rate analysis which needs to be submitted by the Contractor. The Rate Analysis shall contain bifurcation of Material, Labour, transportation and Overhead and Profit Components:

i. Rates derived from similar items of this Contract.

OR

ii. Rates for similar items of work executed through other agencies for MDL recently.

OR

iii. Rates mutually agreed to.

33.2. Variation in the quantities of items in the BOQ is permitted at the same rates provided the total value of the growth does not exceed 25% of the original order value. The same is binding to the contractor and the contractor shall execute the same at the specified rate in the Purchase Order for that item.

33.3. MDL reserves the right to conduct price negotiations with the Contractor in the following cases:

i. Finalization of rates for extra items.

ii. To seek reduction in the unit rates of the items for the excess quantity, if the total value of variation in quantities exceeds 25% of the original order value

34. बाधा / HINDRANCE:

34.1. A Hindrance Register as per attached format at **Enclosure-22** shall be maintained with the Designated Representative from TS Department. The Contractor shall submit schedule for completion of work and get it signed by MDL Engineer in charge of the project. The Schedule

shall list out the major milestones leading to the completion of work as per final delivery date stipulated in the PO/Contract.

34.2. The Hindrance Register shall document the following aspect post placement of the PO/ Contract: -

i. Reasons for the delay vis-à-vis the mutually agreed schedule
ii. Delay in inputs (Drawings/ Documents/ Site Clearances/ Services/ Inspection Call)
iii. Delay by Inspection Agency/ Customer
iv. Delay on account of specialist services
v. Non-performance by the Contractor
vi. Delinquency by the vendor
vii. Force Majeure
viii. Any other relevant reason

34.3. All the hindrances with date of occurrence and removal are to be noted in the hindrance register. The Hindrance Register will be signed by the Designated Representatives from Technical Services Department (MDL) and the authorized Signatory from the Contractor side.

34.4. The Contractor may record their observations in the hindrance register. Any objections raised by the contractor shall be attended to and resolved without any delay.

34.5. In case the contractor has a different opinion for hindrance and a dispute arises, then the matter shall be referred to next higher authority in MDL and the decision shall be communicated to the Contractor within 15 days. The Contractor shall note that the decision of the next higher authority from MDL in case of dispute in respect of hindrances during the course of executing an order/ contract shall be final and binding on the contractor.

34.6. In case, MDL is unable to remove the hindrance immediately and if it is likely to take some time, the contractor shall be informed accordingly by the user. In such cases the contractor onMDL's approval may reduce manpower deployed on the work. **The Contractor shall also note that Under no circumstances Contractor shall be paid for idle manpower.**

35. कचराहटाना /DEBRIS REMOVAL/ स्वच्छता/HOUSEKEEPING:

35.1. Debris generated during execution of work shall be promptly disposed of outside MDL. The site will be maintained clean at all times and the Contractor is expected to budget for the same. Also, during dignitary visits, temporary works materials, debris etc. shall be shifted suitably without any additional cost to MDL.

35.2. In case debris is not removed within two days, MDL will remove the same and the charges towards debris removal @ Rs. 10,000/- per truck shall be deducted from Contractor's RA bills. Engineer-In-charge shall keep the record of the same and forward the details of recoveries in Invoice Certification.

35.3. The site will be maintained neat and clean at all times and the Contractor is expected to budget for the same. MDL has Designated Bins separately for Scrap Steel, Wood Scrap & Rubbish. Contractor shall segregate unusable scrap steel, wood, rubbish, if any, and deposit the same in the nearest respective bin.

35.4. The contractor to submit Certification of Disposal of Scrap/ Debris as per **Enclosure-28**

36. सुरक्षा और प्रशिक्षण /SAFETY AND TRAINING:

36.1. During the Construction Period, Safety Engineers shall be deputed on site as and when required and directed by MDL. This is mandatory requirement.

36.2. All the workers, Engineers of the contractor shall have Safety PPE's (Personnel Protective Equipment's) like Safety Helmets, Safety Shoes, Safety Belts, Hand Gloves, and Goggles etc. Contractors shall also have provision for minimum 5 to 10 visitors PPE's. The periphery of the building shall be covered with the Green net. The contractor shall also provide Safety net and Safety Belts for height work.

36.3. All workers on site shall adhere to the best safety practices applicable. All personal, process & material safety procedures shall be planned & implemented on site. Training & regular inspection shall ensure that safety standards are met.

36.4. First Aid kit & First aid training shall be given to all key members of the Site team.

36.5. Proper signage's shall be placed on site. Warning in case of any critical/hazardous activity shall be given prior to starting of such activity.

36.6. All workers, supervisor's contractor shall optimum training regarding all aspects of site management prior to commencement of work

36.7. Please refer Safety Instruction for sub Contractor's as Enclosed at Annexure 'A'.

37. ठेकेदार के कर्मचारियों का पुलिस सत्यापन /POLICE VERIFICATION OF CONTRACTOR's EMPLOYEES:

37.1. The Contractor shall have to obtain Police Verification Report (PVR) of their Employees prior to deployment at MDL site for execution of the work. A Detailed procedure for Entry Passes for Contractor's Employees is displayed on MDL's website www.mazagondock.in→ Tenders → Technical Services. In addition to this for loss of pass, bidders shall refer **Enclosure-23. BIDDERS ARE REQUESTED TO NOTE THE SAME. NO RELAXATION SHOULD BE ASKED FOR**.

38. प्रतिबंध निविदाकार/फ़र्म/विक्रेता/BANNED OR DE-LISTED TENDERER/FIRMS/ VENDORS:

38.1. The Bidder / Contractor declares that they being Proprietors / Directors / Partners have not been any time individually or collectively blacklisted or banned or de-listed by any Government or quasi Government agencies or PSUs. If a Tenderer's entities as stated above have been blacklisted or banned or de-listed by any Government or quasi Government agencies or PSUs, this fact must be clearly stated in the prescribed format **online** at **Enclosure11**. Filling the information in the said format is Mandatory for every Tenderer. MDL reserves the right to ask for additional information and right to accept /reject the bid.

39. मूल्य वरीयता /PRICE PREFERENCE:

39.1. NO PRICE PREFERENCE SHALL BE GIVEN TO ANY BIDDER IRRESPECTIVE OF THEIR STATUS**.**

40. सार्वजनिक खरीद नीति (मेक इन इंडिया को प्राथमिकता) आदेश 2017/PUBLIC PROCUREMENT POLICY (Preference to Make in India) ORDER 2017:

The Government of India has issued revised Public Procurement (Preference to Make in India) order 2017 on 16th Sep 2020 as part of its policy to encourage "Make in India" and promote manufacturing and production of goods and services in India with a view to enhancing income and employment. Subject to the provisions of this order and to any specific instructions issued by Nodal Ministry or in pursuance of this order, Purchase Preference shall be given to local suppliers in all the procurements undertaken by MDL in the manner specified below:

40.1. **Aspects of 'Preference to Make in India':** The following terminology / definitions used in the policy is enumerated below and applicable to the tender:

i. **Local content:** means the amount of value added in India which shall be the total value of item (goods, services or works or their combination) under procurement (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value in percent.

***Note*:**

a) The local content can be increased by vendors through partnerships, cooperation with local companies, establishing production units in India or Joint Ventures (JV) with Indian suppliers, increasing the participation of local employees in services and training them.

ii. **Class-I Local Supplier**: means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-I Local Supplier' under this Order.

iii. **Class-Il Local Supplier**: means a supplier or service provider, whose goods, services or works offered for procurement, meets the minimum local content as prescribed for 'Class-II Local Supplier' but less than that prescribed for 'Class-I Local Supplier' under this Order.

iv. **Non-Local Supplier:** means a supplier or service provider, whose goods, services or works offered for procurement, has local content less than that prescribed for 'Class-II Local Supplier' under this Order.

v. **Minimum Local Content:** The 'Local Content' requirement to categorize a supplier as 'Class-I Local Supplier' is minimum 50%. For 'Class-II Local Supplier', the 'local content' requirement is minimum 20%.

vi. L1: means the lowest tender or lowest bid or lowest quotation received in a tender, bidding process or other procurement solicitation as adjudged in the evaluation process as per the tender or other procurement solicitation.

vii. Margin of Purchase Preference: means the maximum extent to which the price quoted by a Class-I Local Supplier may be above the L1 for the purpose of purchase preference. The margin of purchase preference shall be 20%.

Note:

1. Procedure for determination of L1 price for the purpose of deciding eligibility for Purchase Preference shall be as per tender Ranking criteria.
2. If Price/s of all Class I Local Supplier/s is more than 20% of L1's price, no purchase preference shall be applicable.

40.2. **Purchase Preference (PP):** Subject to the provisions of the Order and to any specific instructions issued by the Nodal Ministry or in pursuance of the Order, purchase preference shall be given to 'Class-I local supplier' in procurements undertaken by procuring entities in the manner specified here under:

In the procurements of goods or works, which are divisible in nature, and in procurement of services where the bid is evaluated on price alone, the 'Class-I local supplier' shall get purchase preference over 'Class-II local supplier' as well as 'Non-local supplier', as per para 3B Order Public Procurement (preference to Make in India) Order 2017 dated 16.09.2020 or amended thereon.

40.3. **Reciprocity Clause:**

i) Entities of countries which have been identified by the nodal ministry/ department as not allowing Indian Companies to participate in their Government procurement for any item related to that nodal ministry shall not be allowed to participate in Government Procurement in India for all items related to that Nodal Ministry/ Department, except for the list of items published by the Ministry/ Department permitting their participation.

ii) The term 'entity' of a country shall have the same meaning as under the FDI policy of Department for Promotion of Industry and Internal Trade(DPIIT) as amended from time to time.

40.4. **Declaration/ Verification of Local content**

i) Participating bidders to indicate the percentage of local content (i.e. value added in India) along with the details of location/s where thelocal value addition is made, in their bids, item wise or tender wise. The indicated local content percentage shall decide categorization of the vendors as “Class-I Local Supplier” / “Class-II Local Supplier” / “Non-local Supplier”. All bidders should declare that the item and service offered meets the minimum local content & indicate its percentage in their offer which shall meet or excel required local content specified in tender. This declaration is necessary even if Custom Duty Exemption and / or ERV (if applicable) are not being sought. Certification as under is to be submitted mandatorily in technical Offer-Part-I bid.

The bidders shall provide a certificate, as per **Enclosure-10(A)**, chief financial officer or other legally responsible person nominated in writing by the chief executive or senior member/person with management responsibility (corporation, partnership or individual) giving the percentage of local content.

ii) **Bidders to be noted that once the declaration / certification is committed at tender submission stage, the same cannot be altered subsequently at technical negotiation stage or after award of contract otherwise would be treated / considered as false declaration by bidder and necessary action shall be initiated as per Para 40.6 of the said Order for debarment.**

iii) Declared Local Content shall be the basis for categorization of the vendors and tender evaluation. However, MDL reserves the right to undertake detailed examination of declared local content and may call vendor to submit relevant documents.

iv) In cases where MDL received the complaint from any vendor or person, along with the fees prescribed below, verification of Declared Local Content shall be carried out by seeking additional info as deemed necessary and the bidders (including unsuccessful bidders) against the tender shall be obliged to furnish the necessary documents. Failing to do so, the vendor may invite penal action as per the provisions of the Order. If MDL possess the capability, then it shall perform the verification. However, if in the opinion of MDL matter needs to be dealt at higher level, then the complaint shall be referred to Nodal Ministry and their fees / expenses / charges applicable as per the Nodal Ministry, if any, shall be borne by the complainant. MDL is authorized to prescribe fees for handling complaints under revised PPP MII 2017 Order. The fees for filing a complaint under the order shall be Rs. 10,000/- per case. The complaint shall be filed to the Chairman, Public Grievance Cell. The fee shall be deposited by complainant in MDL’s Account by NEFT.

v) On scrutiny of offer, if all the bidders participating in the tender happen to have either not submitted the declaration certificate or not declared /specified the local content percentage in the declaration certificate or specified local content lower than the

minimum local content requirement as per the tender, the subject tender shall be cancelled & matter shall be taken up with Ministry through MDL Nodal Executive. Meanwhile, retendering may be done without applying the provisions of said Order for need fulfilment of MDL.

vi) On opening of the price bids, if it is identified that there is difference in local content declaration made & local content percentage as per price quoted is now not meeting (i.e. lesser than) the specified tender requirement (i.e. only on the quoted price without any loading) then such bidder shall be disqualified and shall not be considered for ranking purpose. The bid would be treated / considered as given false declaration and necessary action for debarment shall be initiated.

40.5. **Price negotiation & contract placement:**

i) MDL has right to negotiate with L1 bidders on the quoted prices. However, it shall be ensured that Local Content percentage as declared by the vendors maintained or increased but not reduced.
The supplier shall provide a Local Content Certificate **Enclosure-10(C),** from chief financial officer or other legally responsible person nominated in writing by the chief executive or senior member/person with management responsibility (corporation, partnership or individual) giving the percentage of local content.

ii) Supplier shall be intimated that the supporting documentation towards realization of committed Local Content as per the contract / order terms &conditions shall be maintained for a period of seven years from the date of completion of the contract for audit purpose. Nodal Ministry may constitute committees with internal & external experts for independent verification of self-declarations and auditor's / accountant's certificates on random basis and in the case of complaints.

40.6. **Debarment of bidders / suppliers:**

i) False declaration will be in breach of Code of Integrity under Rule175(1)(i)(h) of GFR 2017 for which a bidder or its successors can be debarred for up to 2 years as per Rule 151(iii) of GFR 2017 along with such other actions as may be permissible under law.

ii) A supplier who has been debarred by any procuring entity for violation of said Order shall not be eligible for preference under said Order for procurement by any other procuring entity for the duration of debarment. The debarment for such other procuring entities shall take effect prospectively from the date on which it comes to the notice of other procurement entities, in such a manner that ongoing procurements are not disrupted.

41. सामान्य वित्तीय नियमों के नियम 144 (xi) के तहत प्रतिबन्ध/ Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs), 2017:

41.1. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.

41.2. "Bidder" (including the term 'tenderer', 'Consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

41.3. "Bidder from a country which shares a land border with India" for the purpose of this Order means: -

a) An entity incorporated, established or registered in such a country; or
b) A subsidiary of an entity incorporated, established or registered in such a country; or
c) An entity substantially controlled through entities incorporated, established or registered in such a country; or
d) An entity whose *beneficial owner* is situated in such a country; or
e) An Indian (or other) agent of such an entity; or
f) A natural person who is a citizen of such a country; or
g) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

41.4. The beneficial owner for the purpose of **41.3** above will be as under:

i. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(S), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation---

a) "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;
b) "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholder's agreements or voting agreements.

ii. In case of a partnership firm, the beneficial owner is the natural person(S) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

iii. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;

iv. Where no natural person is identified under **(41.4.i) or (41.4.ii) or (41.4.iii)** above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

v. In case of a trust, the identification or beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

41.5. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

41.6. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

41.7. The bidders shall provide Declaration in respect of restriction under Rule 144 (xi) of the General Financial Rules (GFRs), 2017 in the prescribed format as per **Enclosure-10 (E)**

42. सार्वजनिक शिकायत कक्ष /PUBLIC GREIVANCE CELL

42.1. A Public Grievance Cell headed by **Executive Director (Tech)** has been set up in the Company. Members of public having complaints or grievances are advised to contact him on Wednesday between 10:00 hours and 12:30 hours in his office on **4th Floor, D2 Building, East yard, MDL** or send their complaints / grievances to him in

writing for redressal. His Telephone No. is **022- 2376 3512 / 2372 3426 / 8879399826**

43. विवाद समाधान तंत्र /DISPUTE RESOLUTION MECHANISM(DRM) and मध्यस्थता /ARBITRATION:

43.1. Refer General Conditions of Contract Clause No. 23,24,25**.**

44. अधिकार क्शेत्र /JURISDICTION:

44.1. Refer General Conditions of Contract Clause No. 26**.**

45. एमडीएल का अधिकार /MDL's RIGHT:

45.1. MDL reserves the right to consider placement of Order / Contract in part or in full against the tendered quantity or reject any or all tenders without assigning any reasons thereof.

46. बोलीदाताओं / एजेंटो के बिच हितों का टकराव / CONFFLICT OF INTERESST AMONG BIDDERS /AGENTS:

46.1. Conflict of Interest among bidders/ Agents: A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of MDL's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

a) They have controlling partner(s) in common; or
b) They receive or have received any direct or indirect subsidy/ financial stake from any of them; or
c) They have the same legal representative/agent for purposes of this bid; or
d) They have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; or
e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid.
f) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/ management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidder must proactively declare such sister/ common business/ management units in same/ similar line of business.

46.2. Declaration in respect of Conflict of Interest among Bidders/ Agents as per format at **Enclosure-29** is to be submitted by bidder.

We look forward to your participation in on-line bidding by offering your most competitive and reasonable bid against this tender.

Yours faithfully,
For **MAZAGON DOCK SHIPBUILDERS LIMITED**,

GM/HOD (OTS)

Enclosures:

1.	Enclosure-1	-	Form of undertaking to be furnished by the bidder
2.	Enclosure-2	-	Tender Enquiry Acceptance Form
3.	Enclosure-3	-	Details Of General Construction Work
4.	Enclosure-4	-	General Conditions of Contract (GCC) Acceptance Form– GCC attached separately.
5.	Enclosure-5	-	Deviations from Tender Enquiry Form/ GCC
6.	Enclosure-6	-	Financial Information of Bidder
7.	Enclosure-7	-	Details of Existing Commitments & On-going Works-Calculation of Bid capacity.
8.	Enclosure-8	-	Particulars of Experience in Similar Projects
9.	Enclosure-9	-	Personnel available with the Contractor for this Project
10.	Enclosure- 10(A)	-	Declaration Certificate for Local Content **(Sample Filled up Form for Filling Enclosure-10 (A) ATTACHED SEPERATELY)**
11.	Enclosure- 10(C)	-	Actual Local Content Certificate
12.	Enclosure- 10 (E)	-	Declaration in respect of restriction under Rule 144 (xi) of the General Financial Rules (GFRs), 2017
13.	Enclosure- 10 (F)	-	Declaration in respect of debarred under Public Procurement Policy (PPP) Make In India (MII) order 2017
14.	Enclosure-11	-	Banned or Delisted of Firm/Vendor
15.	Enclosure-12	-	MDL Bank Account Details for Online Remittance of Security Deposit/ Performance Bank Guarantee
16.	Enclosure-13	-	Integrity Pact
17.	Enclosure-14	-	RTGS/NEFT/ECS – Mandate Authorisation Form
18.	Enclosure-15	-	Bank Guarantee format for Bid Bond / EMD
19.	Enclosure-16	-	Performance Bank Guarantee Format
20.	Enclosure-17	-	Performa for Waterproofing Bank Guarantee- **Not applicable for this tender**
21.	Enclosure-18	-	Performa for Bank Guarantee against water leakage- **Not applicable for this tender**
22.	Enclosure-19	-	Price Bid (Part-II) - **to be submitted online**
23.	Enclosure-20	-	List of Drawings.– **Not applicable for this tender**
24.	Enclosure-21	-	Scope of Work with Technical specifications
25.	Enclosure-22	-	Hindrance Register Format
26.	Enclosure-23	-	Loss of Pass
27.	Enclosure-24	-	Invoice Certification Format
28.	Enclosure-25	-	Extract of Official Secrets Act, 1923
29.	Enclosure-26	-	CHECKLIST OF SUBMITTALS ATTACHED ALONGWITH ONLINE TECHNICAL BID
30.	Enclosure-27	-	Address Label
31.	Enclosure-28	-	Certification for Disposal of Scrap/Debris
32.	Enclosure-29	-	Declaration in respect of Conflict of Interest among Bidders/ Agents

33.	Enclosure-30	-	ISB format for Bid Bond / EMD
34.	Enclosure-31	-	ISB Format for Performance Bank Guarantee
35.	SAMPLE FORMAT	-	SAMPLE FORMAT FOR FILLING ENCLOSURE-10 (A) OF TENDER
36.	Statutory requirements & Safety clause	-	To be downloaded from our website www.mazagondock.in
37.	Procedure for security passes	-	To be downloaded from our website www.mazagondock.in
38.	ANNEXURE-A		SAFETY INSTRUCTIONS FOR SUB-CONTRACTORS IN MDL, *attached separately*
39.	ANNEXURE-B		STANDARD TERMS AND CONDITION (HR) FOR STATUTORY COMPLIANCE WHILE ENGAGING SUB-CONTRACTORS/ OUTSOURCED MANPOWER AND ITS UNIT *attached separately*

Enclosure-1

FORM OF UNDERTAKING TO BE FURNISHED BY THE BIDDER

(To be typed on Bidder's Letter head)

To,
The General Manager (OTS),
OTS-TS Section
Mazagon Dock Shipbuilders Limited,
Dockyard Road, Mumbai-400 010.
Sir,

Sub: Biennial Rate Contract 2025-2027 for Electrical Works Including minor civil works within MDL premises located at Dockyard Road, Sewree, Anik Chembur, Gavhan, Nhava Yard, South Yard Annex., Residential Quarters at Dockyard Road and Navi Mumbai including works at Naval Dockyard.

Ref: MDL Tender Enquiry No. 1900000242

1. Having visited the site and having examined the General Conditions of Contract, Special Conditions of Contract, Technical Specifications and Bill of Quantities for the above named work, we offer to construct, complete and maintain the whole of the said works in conformity with the said General Conditions of Contract, Special Conditions of Contract, Technical Specifications, and Bill of Quantities for the sum stated in Bill of Quantities included in this Tender Document for such other sum as may be ascertained in accordance with the said conditions of Contract.
2. We undertake to complete and deliver the whole of the works comprised in the Contract within the time stated in this tender.
3. We have independently considered the amount of Liquidated damages indicated in the tender and agree that it represents a fair estimate of the loss likely to be suffered by you in the event of the work(s) not being completed in time.
4. If our Tender is accepted, we will, when required, obtain the guarantees from a Bank (to be approved by you) to be jointly and severally bound with us for the sum named in the tender for the due performance of the Contract under the terms of a Bond to be approved by you.
5. The Contractor's All Risk Policy for the full value of the Contract valid till the completion period will be obtained by us in the joint names of Mazagon Dock Shipbuilders Limited and ourselves.
6. We agree to abide by this Tender for the period of **180** days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiry of this period.
7. Unless and until a formal Agreement or Order is prepared and executed, this tender together with your written acceptance thereof, shall constitute a binding Contract between us.
8. We understand that if our Tender-Bid is accepted, we are to be jointly and severally responsible for the due performance of the Contract.
9. We understand that you are not bound to accept the lowest or any Tender you may receive.
10. We undertake to comply with the Anti-profiteering provisions of GST Act 2017 and we will pass on the benefits from reduction in the rate of Tax/input Tax credit if any, to MDL and there will be no liability on MDL on account of GST/Input Tax Credit.

Dated this _____ day of _____(year)

Signature_____ in the capacity of _____

duly authorised to sign Tenders for and on behalf of_____

_____

(IN BLOCK CAPITALS)

Witness:

Signature_____ Address of Witness_____

Name _____ Occupation _____

Enclosure-2

TENDER ENQUIRY (TEF) ACCEPTANCE FORM

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED

TENDER ENQUIRY No. 1900000242

TEF CLAUSE NO.	TENDERER'S REMARK ACCEPTED/ DEVIATION	TEF CLAUSE NO.	TENDERER'S REMARK ACCEPTED/ DEVIATION
1		24	
2		25	Not Applicable
3		26	Not Applicable
4		27	
5		28	
6		29	
7		30	
8		31	
9		32	
10		33	
11		34	
12		35	
13		36	
14		37	
15		38	
16		39	
17		40	
18		41	
19		42	
20		43	
21		44	
22		45	
23		46	

COMPANY'S NAME &ADDRESS :

_____

_____

_____

SIGNATURE:

DATE:

NAME:

DESIGNATION:

TENDERER'S COMPANY SEAL:

NOTES :

1. Bidder(s) should carefully read the Tender Enquiry Terms & Conditions (TEF) included in the tender prior to filling up this acceptance format.
2. Bidder(s) should indicate Accepted/ Deviation Taken for each clause number in the above table.
3. Bidder(s) to attach Separate Sheet indicating all relevant details such as Number & description of the Clause, Reasons for Deviation and Alternative suggested for any deviations taken by them in the prescribed format indicated at **Enclosure-5.**
4. TEF clause numbers shown in the above format also includes the sub-clauses under these clauses. For example 4 means – clause nos. 4, 4(i), 4(ii) etc.

Enclosure-3

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

Details of General Construction Work

(To be typed on Bidders Letterhead & submitted)

Sr. No	Financial Year	Particulars	Amount in Rs.
1		Annual turnover of General electrical work in any of the year over a period of 07years, ending 31st March 2024	
2		Out of the above, annual turnover in the relevant year from electrical Work	

_____
Signature of Chartered Accountant with Seal

_____
Signature and Seal of the Bidder

Enclosure-4

ACCEPTANCE FORM FOR GENERAL CONDITIONS OF CONTRACT (GCC)

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED

TENDER ENQUIRY No. 1900000242

GCC CLAUSE No.	TENDERER'S REMARK	GCC CLAUSE No.	TENDERER'S REMARK	GCC CLAUSE No.	TENDERER'S REMARK
	ACCEPTED/ DEVIATION		ACCEPTED/ DEVIATION		ACCEPTED/ DEVIATION
1		38		75	
2		39		76	
3		40		77	
4		41		78	
5		42		79	
6		43		80	
7		44		81	
8		45		82	
9		46		83	
10		47		84	
11		48		85	
12		49		86	
13		50		87	
14		51		88	
15		52		89	
16		53		90	
17		54		91	
18		55		92	
19		56		93	
20		57		94	
21		58		95	
22		59		96	
23		60		97	
24		61		98	
25		62		99	
26		63		100	
27		64		101	
28		65		102	
29		66		103	
30		67		104	
31		68		105	
32		69		106	
33		70		107	
34		71		108	
35		72		109	
36		73		110	Not Applicable
37		74			

COMPANY'S NAME & ADDRESS:

_____

_____

_____

SIGNATURE:
DATE:
NAME:
DESIGNATION:
TENDERER'S COMPANY
SEAL:

NOTES:

1. Bidder(s) should carefully read the General Conditions OF CONTRACT (GCC) of the Tender Enquiry prior to filling up this acceptance format.

2. Bidder(s) should indicate Accepted/ Deviation Taken for each clause number in the above table.

3. Bidder(s) to attach Separate Sheet indicating all relevant details such as Number & description of the Clause, Reasons for Deviation and Alternative suggested for any deviations taken by them in the prescribed format indicated at **Enclosure-5**.

4. Clause numbers shown in the above format also includes the sub-clauses under these clauses. For example, Clause no. 56 means – Clause nos. 56, 56 i), 56 a) etc.

Enclosure-5

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

DEVIATIONS FROM CONDITIONS OF TENDER ENQUIRY FORM/GCC/ Technical specification

All deviations from the Conditions of Tender Enquiry Form/ GCC shall be filled in by the bidder clause by clause in this Schedule. If deviations are discussed in the covering Letter of Tender, then reference to the said letter shall be made below. (Mention "NIL", in case no deviation)

Clause No.	Contractual requirement	Deviation proposed by the Bidder	Reason for proposed deviation
(1)	(2)	(3)	(4)

The Bidder hereby certifies that the above mentioned are the only deviations from the Conditions of Contract.

SIGNATURE _____
NAME _____
DESIGNATION _____
COMPANY SEAL COMPANY _____
DATE _____

Enclosure-6

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

Financial Information of Bidder

(To be typed on Bidders Letterhead & submitted)

Description	FY 2019-20	FY 2020-21	FY 2021-22 ₹	FY 2022-23 ₹	FY 2023-24	Maximum Value ₹
	V	W	X	Y	Z	**(A)**
Maximum value of engineering (Electrical) works						
Above Value updated at the current price level by applying a weightage of 7% per annum						

_____
Signature of Chartered Accountant with Seal

_____
Signature and Seal of the Bidder

Enclosure-7

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

Details of Existing Commitments & On-going Works

(To be typed on Bidders Letterhead & submitted)

1	2	3	4	5	6	7	8
Sr. No.	Name of the Work/Project	Contract Value (₹)	Date of start as per PO/Contract	Date of Completion as per PO/Contract	Work Done up to the preceding Month of submission of Bid (₹)	Value of existing commitments and on-going works to be completed (for all the Clients of the Bidder) during the period of completion of work for which bids have been invited (₹)	Value updated at the current price level (₹)

Note: The bidder shall also include the value of all such works which are awarded to bidder but yet not started up to the last day of preceding month of submission of bid.

CALCULATION OF AVAILABLE BID CAPACITY

(a) Available Bid Capacity = [AxNx1.5]-B, where

i. A = Maximum value of engineering (Electrical) works executed in any one year during the last five years (updated at the current price level by applying a weightage of 7% per annum), taking into account the completed as well as works in progress. Value of engineering works executed during last five years shall be certified by Chartered Accountant and shall be considered for evaluation.

ii. **N =** Number of years prescribed for completion of work for which bids have been invited = **2 (24 Months).**

iii. B = Value (updated at the current price level) of the existing commitments and ongoing works to be completed in the next 'N' years. This statement should be submitted duly verified by Chartered Accountant.

Note: -

a) The yield rate of GoI bonds as on the closing date of the tender shall be considered as discounting factor for updation of the value of “B”.

Available Bid Capacity = ₹_____

Note: The bidder should attach the proof for 'A' & 'B' mentioned above.

_____
Signature of Chartered Accountant with Seal

_____
Signature and Seal of the Bidder

Enclosure-8

PARTICULARS OF EXPERIENCE IN SIMILAR PROJECTS

The General Manager,
OTS Department,
6th Floor, Service Blcock Bldg. NY,
Mazagon Dock Shipbuilders Limited,
Dock Yard Road,
Mumbai - 400010, INDIA

Sir,

Sub: Biennial Rate Contract 2025-2027 for Electrical Works Including minor civil works within MDL premises located at Dockyard Road, Sewree, Anik Chembur, Gavhan, Nhava Yard, South Yard Annex., Residential Quarters at Dockyard Road and Navi Mumbai including works at Naval Dockyard.

Ref: MDL Tender No. 1900000242.

With reference to the above and after having read the terms & conditions in the Tender Enquiry, we wish to submit our bid for consideration of pre-qualification under **Clause 7.1.1.1/7.1.1.2/7.1.1.3** (*strike out whichever is not applicable*) of the tender. The details of similar projects as stipulated in the tender enquiry form and completed satisfactorily by us are as under:

Clause7.1.1.1: Three similar completed works each costing not less than **₹ 142 Lakhs.**

Sr. No	PO No & Date	Completion Cost	Work order (Submitted/Not submitted)	Completion Certificate (Submitted/Not Submitted)
1				
2				
3				

OR

Clause7.1.1.2: Two similar completed works each costing not less than **₹ 177 Lakhs.**

Sr. No	PO No & Date	Completion Cost	Work order (Submitted/Not submitted)	Completion Certificate (Submitted/Not Submitted)
1				
2				

OR

Clause7.1.1.3: One similar completed work costing not less than **₹ 284 Lakhs.**

Sr. No	PO No & Date	Completion Cost	Work order (Submitted/Not submitted)	Completion Certificate (Submitted/Not Submitted)
1				

2. The brief details of above similar projects are as under: (Use separate sheet for each work)

i.	Project Name:	
ii.	Project Location	
iii.	Client:	
iv.	Address of the Client & contact person with Tel No. & Fax No	
v.	Brief Description of the work	
vi.	Cost of project	

vii.	Contract/Work order No:	
viii.	Completion Certificate details viz, ref. No & date of issue	
ix.	Date of Commencement of Work	
x.	Date of completion work	

3. The following documents in support of the above similar projects are enclosed in our techno-commercial bid:
   1. Copy of Work Order/Contract Agreement indicating contract amount, Project/Work value, Scope of Work & other details with signature of Both Parties.
   2. Work Completion Certificates issued by the Client(s) indicating proper reference of Contract Agreement & Date of Completion.
   3. Any other document (*please specify*)

4. We further agree to produce originals of the documents submitted in respect of the similar projects detailed above for verification by MDL as and when called for.

Signature of Contractor:

Name and Address:

Place:

Date: Official Seal

Enclosure-9

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

KEY PERSONNEL AVAILABLE WITH THE CONTRACTOR FOR THIS PROJECT

Bidders should provide information of personnel of relevant discipline (Engineers & Supervisors) including Safety Officer(s) who will be deployed for this Project in the following prescribed format.

Sl No.	Designation of the Personnel with Discipline	No of Personnel to be deployed	Month wise Duration of Deployment for this project	No of Years of Relevant Experience

Enclosure-10 (A)

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

DECLARATION CERTIFICATE FOR LOCAL CONTENT

This declaration serves as a declaration form for the bidders. (Before completing this declaration, bidders must study the General Conditions, Definitions, Govt. Directives applicable in respect of Local Content & prescribed tender conditions). **THE BIDDER SHALL PROVIDE THIS CERTIFICATE FROM CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CORPORATION, PARTNERSHIP OR INDIVIDUAL).**

IN RESPECT OF BID/ TENDER No. 1900000242
ISSUED BY: **MAZAGON DOCK SHIPBUILDERS LIMITED**

I, the undersigned, ... (full names),
do hereby declare, in my capacity as ..... of
.....(name of bidder entity),
the following:

(a) The facts contained herein are within my own personal knowledge.

(b) I have read and understood the requirement of local content (LC) and same is specified as percentage calculated in accordance with the definition provided at clause 2 of revised Public Procurement (preference to Make in India) Order2017.

"Local content" as per above order means the amount of value added in India which shall be the total value of items procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value in percent."

(c) I have satisfied myself that the goods/services/works to be delivered in terms of the above specified bid comply with the local content requirements as specified in the tender for 'Class- I Local Supplier' / 'Class-II Local Supplier', and as above.

(d) The local content calculated using the definition given above are as under:

Tender Item Sr No	Local content calculated as above %	Location of value addition (Location shall be specified as name of city or district etc.)

Attach separate sheet duly signed if space is not sufficient

NB: **Local content percentage shall be declared item wise or tender wise strictly as per**

the terms of the tender.

(e) I accept that the Procurement Authority / Institution / MDL / Nodal Ministry has the right to request that the local content be verified in terms of the requirements of revised Public Procurement (preference to Make in India) Order2017 dtd16.09.2020 and I shall furnish the document / information on demand. Failure on my part to furnish the data will be treated as false declaration as per PPP MII Order 2017. In case of contract being awarded, I undertake to retain the relevant documents for 7 years from date of execution.

(f) I understand that the submission of incorrect data, or data that are not verifiable as described in revised Public Procurement (preference to Make in India) Order 2017, may result in the Procurement Authority / Nodal Ministry / MDL imposing any or all of the remedies as provided for in Clause 9 of the Revised Public Procurement (preference to Make in India) Order 2017 dated 16.09.2020.

SIGNATURE of the Bidder:_____ **DATE:_____**

Seal / Stamp of Bidder

SIGNATURE:*(TO BE SIGNED BY AUTHORISED SIGNATORY STRICTLY AS PER TEF CLAUSE NO. 40.4.i) & STAMPED-VIZ;* CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CORPORATION, PARTNERSHIP OR INDIVIDUAL).

Enclosure-10 (C)

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

ACTUAL LOCAL CONTENT CERTIFICATE

Note 1: This certificate shall be submitted by the successful bidder post execution of the contract.

LOCAL CONTENT DECLARATION (post execution of contract / PO). THE SUPPLIER SHALL PROVIDE THIS CERTIFICATE FROM CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CORPORATION, PARTNERSHIP OR INDIVIDUAL).

IN RESPECT OF CONTRACT No./ PO No. 1900000242.
ISSUED BY: MAZAGON DOCK SHIPBUILDERS LIMITED

I, the undersigned, ... (full names), do hereby declare, in my capacity as ..... of .....(name of bidder entity), that:

(a) The facts contained herein are within my own personal knowledge.

(b) My/our company has declared the local content at the time of tender asunder

Tender Item Sr. No.	Local content calculated as above %	Location of local value addition

(c) My/our company has completed the above referred contract and the actual local content of the delivered item/s calculated using the definition in the declaration given at the time of bid is as under:

Tender Item SrNo	Declared minimum Local content at the time of bidding (%)	Achieved Local content of delivered items (%)

NB: Local content percentage shall strictly be declared item wise or tender wise as was declared at the time of bid / tender.

(d) I accept that the Procurement Authority / Institution / MDL / Nodal Ministry has the right to request that the local content be verified in terms of the requirements of revised Public Procurement (preference to Make in India) Order2017 dtd 16.09.2020 and I shall furnish the document / information on demand. Failure on my part to furnish the data will be treated as false declaration as per PPP MII Order 2017. I undertake to retain the

relevant documents for 7 years from date of execution.

(e) I understand that the submission of incorrect data, or data that are not verifiable as described in revised Public Procurement (preference to Make in India) Order2017, may result in the Procurement Authority / Nodal Ministry / MDL imposing any or all of the remedies as provided for in Clause 9 of the Revised Public Procurement (preference to Make in India) Order 2017 dated 16.09.2020.

SIGNATURE of the Bidder:_____ **DATE:**_____

Seal / Stamp of Bidder

SIGNATURE:*(TO BE SIGNED BY AUTHORISED SIGNATORY STRICTLY AS PER TEF CLAUSE NO. 40.5.i) & STAMPED-VIZ;* CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CORPORATION, PARTNERSHIP OR INDIVIDUAL).

Enclosure-10 (E)

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

Declaration in respect of restriction under Rule 144 (xi) of the General Financial Rules (GFRs), 2017

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authorities and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authorities. I hereby certify that this bidder fulfils all requirements in this regards and is eligible to be considered. (Where applicable, evidence of valid registration by the Competent Authorities shall be attached]

SIGNATURE:_____ **DATE:**_____

Seal / Stamp of Bidder

Enclosure-10 (F)

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

Declaration in respect of debarred under Public Procurement Policy (PPP) Make In India (MII) order 2017, GeM, CPPP including Tender holiday issued by MDL.

*I have read the **Clause No. 40** of the Tender and hereby declare that I/ we have not been debarred by any Government or quasi Government agencies or PSU's under Public Procurement Policy (PPP) Make In India (MII) order 2017, GeM and CPPP.*

Further, I hereby declare that I/ we have not been given the Tender holiday by MDL.

SIGNATURE:_____ **DATE:**_____

Seal / Stamp of Bidder

Enclosure-11

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

PARTICULARS OF BANNED OR DE-LISTED TENDERER/FIRM/VENDORS

The General Manager,
OTS Department,
6th Floor, Service Block Bldg. NY,
Mazagon Dock Shipbuilders Limited,
Dock Yard Road,
Mumbai - 400010, INDIA

Sir,

Sub: Biennial Rate Contract for Electrical Works Including minor civil works within MDL premises located at Dockyard Road, Sewree, Anik Chembur, Gavhan, Nhava Yard, South Yard Annex., Residential Quarters at Dockyard Road and Navi Mumbai including works at Naval Dockyard.

Ref: MDL Tender No. 1900000242.

With reference to **Clause no: 38** (Banned or De-Listed Tenderer/ Firms / Vendors), referred Tender Enquiry, we declare the Information as below.

A. In case of Banned / Blacklisted by the client.

Sl	Name of Government/ quasi Government agencies/or PSUs who has Banned/Black listed	Name of Project value which firm is Banned/ Blacklisted	Banned/ Black listed for the Duration	Reasons

B. In case of penal Action Proceeding / Show cause notices initiated/issued by the Government or quasi Government agencies or PSU's including Pending in Judicial proceedings:

Sl	Name of Client	Name of Project / Work	Status

C. The bidding firm to enclose / submit all relevant documents pertaining to Sr. no. A &Sr no. B above.

Signature of Contractor:

Name and Address:

Place:
Date:

Official Seal

Enclosure-12

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

MAZAGON DOCK SHIPBUILDERS LIMITED
DOCKYARD ROAD
MUMBAI - 400010

1. **MDL'S BANK ACCOUNT DETAILS:**

NAME OF BANK A/C HOLDER	:	MAZAGON DOCK SHIPBUILDERS LTD
BANK AND BRANCH	:	STATE BANK OF INDIA, MAZAGON BRANCH, MUMBAI
BRANCH CODE	:	9054
BANK ACCOUNT NO	:	10005255246
IFSC CODE		SBIN0009054
MICR/NECS CODE		400002120
INCOME TAX PAN NO		AAACM8029J
INCOME TAX TAN NO		MUMM02076E

2. **DETAILS OF REMITTANCE TO MDL'S BANK ACCOUNT:**
(To be filled in by the vendors/firms making remittance of funds in MDL'S Bank Account)

Date of Remittance	**Name of Firm**	**UTR No.**	**MDL tender/PO. Ref No.**	**Nature of Remittance viz. Performance Bank Guarantee etc.**	**Amount Remitted (₹)**
			MDL Tender No. 1900000242		

_____
Signature of Bidder

3. SAP Parked document No: _____ Date: _____
(To be filled in by MDL's Commercial Executive)

Enclosure-13

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

INTEGRITY PACT

MAZAGON DOCK SHIPBUILDERS LIMITED (MDL) hereinafter referred to as "**The Principal/Buyer**"

And

.....hereinafter referred to as "**The Bidder/ Contractor**"

Preamble

The Principal/Buyer intends to award, under laid down organizational procedures, contract/s for .....The Principal/Buyer values full compliance with all relevant laws of the and, rules, regulations, economic use of resources and of fairness / transparency in its relations with its Bidder(s) and /or Contractor(s).

In order to achieve these goals, the Principal/Buyer shall appoint an Independent External Monitor (IEM), who shall monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 - Commitments of the Principal/Buyer:

(1) The Principal/Buyer commits itself to take all measures necessary to prevent corruption and to observe the following principles:

a) No employee of the Principal/Buyer, personally or through family members, shall in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

b) The Principal/Buyer shall during the tender process treat all Bidder(s) with equity and reason. The Principal/Buyer shall in particular, before and during the tender process, provide to all Bidder(s) the same information and shall not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

c) The Principal/Buyer shall exclude from the process all known prejudiced persons.

d) The Principal/Buyer undertakes to scrupulously follow the Purchase Manual containing General Conditions of Contract (GCC) in respect of procurement contracts for goods, services and civil works.

(2) If the Principal/Buyer obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti Corruption Laws of India, or it there be a substantive suspicion in this regard, the Principal/Buyer shall inform the Chief Vigilance Officer, MDL and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/Contractor(s):

(1) The Bidder(s)/Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

a) The Bidder(s)/Contractor(s) shall not, directly or through any other persons or firm, offer promise or give to any of the Principal/Buyer's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage or any kind whatsoever during the tender process or during the execution of the contract.

b) The Bidder(s)/Contractor(s) shall not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal.
This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

c) The Bidder(s)/Contractor(s) shall not commit any offence under the relevant Anti-Corruption Laws of India; further the Bidder(s)/Contractor(s) shall not use improperly, for purposes of competition or personal gain, or pass on to other, any information or document provided by the Principal/Buyer as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly, the Bidder(s)/Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any. All payments made to the Indian Agent/representative have to be in Indian Rupees only. Further details as mentioned in the “Guidelines of Indian Agents of Foreign suppliers” shall be disclosed by the Bidders(s)/Contractor(s). Copy of the "Guidelines on Indian Agents of Foreign Suppliers" as annexed and marked as Annexure-A.

e) The Bidder(s)/Contractor(s) shall when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

f) The Bidder (s)/Contractor(s), their agents, representatives shall not do such things so as to interfere with the procedures laid down in the Principal/Buyer’s Purchase Manual containing the General Conditions of Contract (GCC) in respect of procurement contracts for goods, services and civil works.

(2) The Bidder(s)/Contractor(s) shall not instigate third persons to commit offences outlines above or be an accessory to such offences.

Section 3 - Disqualification from tender process and exclusion from future contracts:

If the Bidder(s)/Contractor(s) before contract award has committed a transgression through a violation of Section 2, above or in any other form such as to put his reliability or credibility as Bidder(s) in question, the Principal/Buyer is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or to terminate the contract, if already signed for such reason, as per the procedure mentioned in the "Guidelines on Banning of business dealings" Copy of the "Guidelines on Banning of business dealings" is annexed and marked as Annexure-B.

1) If the Bidder(s)/Contractor(s) has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal/Buyer is entitled also to exclude the Bidder(s)/Contractor(s) from future contract award processes. The

imposition and duration of the exclusion shall be determined by the severity of the transgression. The severity shall be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressors within the company hierarchy of the Bidder(s) and the amount of the damage. The exclusion shall be imposed for a minimum of six months and maximum of five years, which may be further extended at the discretion of the Principal/Buyer.

2) A transgression is considered to have occurred, if the Principal/Buyer after due consideration of the available evidence, concludes that no reasonable doubt is possible.

3) The Bidder (s) accepts and undertakes to respect and uphold the Principal/Buyer's absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining legal advice.

4) If the Bidder(s)/Contractor(s) can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal/Buyer may revoke the exclusion prematurely.

Section 4 – Sanctions for Violation:

(1) Any breach of the aforesaid provisions by the Bidder or any one employed by him or acting on his behalf (whether with our without the knowledge of the Bidder) or the commission of any offence by the Bidder or any one employed by him or acting on his behalf, as defined in Chapter IX of the Indian Penal Code, 1860 or the Prevention of Corruption Act 1988 or any other Act enacted for the prevention of corruption shall entitle the Principal/Buyer to take all or any one of the following actions, wherever required –

a) To immediately call off the pre-contract negotiations without assigning any reason or giving any compensation to the Bidder. However, the proceedings with the other Bidder (s) would continue.

b) The Earnest Money Deposit/Security Deposit/Performance Bond shall stand forfeited either fully or partially, as decided by the Principal/Buyer, and the Principal/Buyer shall not be required to assign any reason therefor.

c) To immediately cancel the contract, if already signed, without giving any compensation to the Bidder.

d) To recover all sums already paid by the Principal/Buyer, in case of an Indian Bidder

e) with interest thereon at 2% higher than the prevailing Base Rate of SBI, and in case of a Bidder from a country other than India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to the Bidder from the Buyer in connection with any other contract for any other Defence stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.

f) To encash the advance Bank Guarantee and Performance Bond/Warranty bond, if furnished by the Bidder, in order to recover the payments, already made by the Principal/Buyer, along with interest.

g) To cancel all or any other contracts with the Bidder.

h) To debar the Bidder from entering into any bid from Principal/Buyer for a minimum period of five years, which may be further extended at the discretion of the Principal/Buyer.

i) To recover all sums paid in violation of this Pact by Bidder(s) to any middleman or agent or broker with a view to securing the contract.

j) If the Bidder or any employee of the Bidder or any person acting on behalf of the Bidder, either directly or indirectly, is closely related to any of the officers of the Buyer, or alternatively, if any close relative of an officer of the Buyer has financial interest/stake in the Bidder's firm, the same shall be disclosed by the Bidder at the time of filing of tender. Any failure to disclose the interest involved shall entitle the Buyer to rescind the contract without payment of any compensation to the Bidder.

The term 'close relative' for this purpose would mean spouse whether residing with the Principal/Buyer's employee/employees or not, but not include a spouse separated from the Principal/Buyer's employee/employees by a decree or order of a competent court; son or daughter or step son or step daughter and wholly dependent upon Principal/Buyer's employee/employees, but does not include a child or step child who is no longer in any way dependent upon the Principal/Buyer's employee/employees or of whose custody the Principal/Buyer's employee/employees has been deprived of by or under any law; any other person related, whether by blood or marriage, to the Principal/Buyer's employee/employees or to the Principal/Buyer's employee/employees wife or husband and wholly dependent upon Principal/Buyer's employee/employees.

k) The Bidder shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal/Buyer, and if he does so, the Principal/Buyer shall be entitled forthwith to rescind the contract and all other contracts with the Bidder. The Bidder shall be liable to pay compensation for any loss or damage to the Principal/Buyer resulting from such rescission and the Principal/Buyer shall be entitled to deduct the amount so payable from the money(s) due to the Bidder.

l) In cases where Irrevocable Letters of Credit have been received in respect of any contract signed by the Principal/Buyer with the Bidder, the same shall not be opened.

(2) The decision of the Principal/Buyer to the effect that a breach of the provisions of this Integrity Pact has been committed by the Bidder shall be final and binding on the Bidder, however, the same Bidder can approach the Monitor(s) appointed for the purposes of this Pact.

Section 5 - Previous Transgression:

(1) The Bidder declares that no previous transgressions occurred in the last three years with any other company in any country conforming to the anti-corruption approach or with any other public section enterprise in India that could justify his exclusion from the tender process.

(2) If the bidder makes incorrect statement on this subject, he can be disqualified from the tender process or further action can be taken.

Section 6 - Equal treatment of all Bidders/Contractor(s)/Subcontractors:

(1) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this integrity Pact, and to submit it to the Principal before contract signing.

(2) The Principal/Buyer shall enter into agreements with identical conditions as this one with all bidders, contractors and subcontractors.

(3) The Principal/Buyer shall disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 - Criminal charges against violation Bidder(s)/Contractor(s)/ Subcontractor(s):

(1) If the Principal/Buyer obtains knowledge of conduct of a Bidder, Contractor or subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor of subcontractor which constitutes corruption or if the Principal has substantive suspicion in this regard, the Principal/Buyer shall inform the same to the Chief Vigilance Officer, MDL.

Section 8 - Independent External Monitor/Monitors:

(1) The Principal/Buyer appoints competent and credible independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively whether and to what extent the parties comply with the obligations under this agreement.

(2) The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairman & Managing Director of the Principal/Buyer.

(3) The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all project documentation of the Principal/Buyer including that provided by the Contractor. The Contractor shall also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The

(4) same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s)/Subcontractor(s) with confidentiality.

(5) The Principal/Buyer shall provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations, between the Principal/Buyer and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

(6) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he shall so inform the Management of the Principal/Buyer and request the Management to discontinue or take corrective action, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action. However, the Monitor shall give an opportunity to the Bidder(s)/Contractor(s) to present its case before making its recommendation to the Principal/Buyer.

(7) The Monitor shall submit a written report to the Chairman & Managing Director of the Principal within 8 to 10 weeks from the date of reference or intimation to him by the Principal/Buyer and, should the occasion arise, submit proposals for correcting problematic situations.

(8) Monitor shall be entitle to compensation on the same terms as being extended to / provided to Independent Directors on the Board of Principal/Buyer.

(9) If the Monitor has reported to the Chairman & Managing Director of the Principal, a substantiated suspicion of an offence under relevant Anti-Corruption Laws of India and the Chairman & Managing Director of the Principal/Principal/Buyer has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

(10) The word 'Monitor' would include both singular and plural.

Section 9 - Pact Duration:

This pact begins when both parties have legally signed it. It expires for the Contractor **12 months** after the last payment under the contract and for all other Bidders **06** months after the contract has been awarded.

If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above unless it is discharged / determined by Chairman & Managing Director of the Principal/Buyer.

Section 10 - Other provisions:

(1) This agreement is subject to Indian Law, place of performance and jurisdiction is the

(2) Registered Office of the Principal/Buyer, i.e. Mumbai. The Arbitration clauses provided in the main tender document/ contract shall not be applicable for any issue/dispute arising under this Integrity pact.

(3) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

(4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties shall strive to come to an agreement to their original intentions.

_____	_____
For & on behalf of MAZAGON DOCK SHIPBUILDERS LIMITED (Office Seal) Place_____ Date_____	For & on behalf of Bidder/Contractor (Office Seal)
Witness 1: (Name & Address)	Witness 1: (Name & Address)
_____	_____
_____	_____
_____	_____

Annexure-A

GUIDELINES FOR INDIAN AGENTS OF FOREIGN SUPPLIERS

1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with MDL shall apply for registration.

1.1 An agent shall represent only one Foreign Supplier and not represent two suppliers or quote on their behalf in the same tender.

However, either the Indian Agent on behalf of the Foreign Suppliers (also includes foreign manufacturers) or the Foreign Suppliers (also includes foreign manufacturers) directly could bid in a tender, but not both. In cases where an agent participates in a tender on behalf of one manufacturer, shall not quote on behalf of another manufacturer along with the first Manufacturer in a subsequent/parallel tender for the same item.

1.2 Registered agents shall file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/remuneration/salary/ retainer ship being paid by the principal to the agent before the placement of order by MDL.

1.3 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.

2.0 **DISCLOSURE OF PARTICULARS OF AGENTS/ REPRESENTATIVES IN INDIA, IF ANY**.

2.1 Tenderers of Foreign nationality shall furnish the following details in their offer:

2.2.1 The name and address of the agents/representatives in India, if any and the extent of authorization and authority given to commit the Principals. In case the agent/representative be a foreign Company, it shall be confirmed whether it is real substantial Company and details of the same shall be furnished.

2.2.2 The amount of commission/remuneration included in the quoted price(s) for such agents/representatives in India.

2.2.3 Confirmation of the Tenderer that the commission/ remuneration if any, payable to his agents/ representatives in India, may be paid by MDL in Indian Rupees only.

2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:

2.2.1 The name and address of the foreign principals indicating their nationality as well as their status, i.e, whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/representatives.

2.2.2 The amount of commission/remuneration included in the price (s) quoted by the Tenderer for himself.

2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/remuneration, if any, reserved for the Tenderer in the quoted price (s), may be paid by MDL in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.

2.3 In either case, in the event of contract materializing, the terms of payment shall provide for payment of the commission /remuneration, if any payable to the agents/representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.

2.4 Failure to furnish correct and detailed information as called for in paragraph-2.0 above shall render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by MDL. Besides this there would be a penalty of banning business dealings with MDL or damage or payment of a named sum.

Annexure-B

GUIDELINES ON BANNING OF BUSINESS DEALINGS

CONTENTS

1. **Introduction**

1.1 Mazagon Dock Shipbuilders Limited (MDL), being a Public Sector Enterprise and 'State', within the meaning of Article 12 of Constitution of India, has to ensure preservation of rights enshrined in Chapter III of the Constitution. MDL as also to safeguard its commercial interests. MDL deals with Agencies, who have a very high degree of integrity, commitments and sincerity towards the work undertaken. It is not in the interest of MDL to deal with Agencies who commit deception, fraud or other misconduct in the execution of contracts awarded / orders issued to them. In order to ensure compliance with the constitutional mandate, it is incumbent on MDL to observe principles of natural justice before banning the business dealings with any Agency.

1.2 Since banning of business dealings involves civil consequences for an Agency concerned, it is incumbent that adequate opportunity of hearing is provided and the explanation, if tendered, is considered before passing any order in this regard keeping in view the facts and circumstances of the case.

2. **Scope**

2.1 MDL reserves its rights to remove from list of approved suppliers / contractors or to ban business dealings if any Agency has been found to have committed misconduct and also to suspend business dealings pending investigation.

2.2 Similarly, in case of sale of material there is a clause to deal with the Agencies / customers / buyers, who indulge in lifting of material in unauthorized manner.

2.3 However, absence of such a clause does not in any way restrict the right of MDL to take action / decision under these guidelines in appropriate cases.

2.4 The procedure of (i) Removal of Agency from the List of approved suppliers / contractors; (ii) Suspension and (iii) Banning of Business Dealing with Agencies, has been laid down in these guidelines.

2.5 These guidelines apply to all the Divisions/Yards of MDL.

2.6 It is clarified that these guidelines do not deal with the decision of the Management not to entertain any particular Agency due to its poor / inadequate performance or for any other reason.

2.7 The banning shall be with prospective effect, i.e., future business dealings.

3. **Definitions**

In these Guidelines, unless the context otherwise requires:

a) 'Bidder / Contractor / Supplier / Purchaser / Customer' shall mean and include a public limited company or a private limited company, a firm whether registered or not, an individual, a cooperative society or an association or a group of persons engaged in any commerce, trade, industry, etc. 'Bidder / Contractor / Supplier / Purchaser / Customer' in the context of these guidelines is indicated as 'Agency'.

b) 'Inter-connected Agency' shall mean two or more companies having any of the following features:

   a) If one is a subsidiary of the other.

   b) If the Director(s), Partner(s), Manager(s) or Representative(s) are common;

   c) If management is common;

   d) If one owns or controls, the other in any manner;

c) 'Competent Authority' and 'Appellate Authority' shall mean the following:

   a) Functional Director shall be the 'Competent Authority' for the purpose of these guidelines. CMD, MDL shall be the 'Appellate Authority'.

b) CMD, MDL shall have overall power to take suo-moto action on any information available or received by him and pass such order(s) as he may think appropriate, including modifying the order(s) passed by any authority under these guidelines.

d) 'Investigating Department' shall mean any Department or Unit investigating into the conduct of the Agency and shall include the Vigilance Department, Central Bureau of Investigation, the State Police or any other department set up by the Central or State Government having powers to investigate.

e) 'List of approved Agencies – 'Bidder / Contractors / Suppliers / Purchasers / Customers shall mean and include list of approved / registered Agencies - 'Bidder / Contractors / Suppliers / Purchasers / Customers, etc.

4. **Initiation of Banning / Suspension**

Action for banning / suspension business dealings with any Agency should be initiated by the department having business dealings with them after noticing the irregularities or misconduct on their part. Besides the concerned department, Vigilance Department may also be competent to initiate such action.

5. **Suspension of Business Dealings**

5.1 If the conduct of any Agency dealing with MDL is under investigation by any department, the Competent Authority may consider whether the allegations under investigation are of a serious nature and whether pending investigation, it would be advisable to continue business dealing with the Agency. If the Competent Authority, after consideration of the matter including the recommendation of the Investigating Department, if any, decides that it would not be in the interest to continue business dealings pending investigation, it may suspend business dealings with the Agency. The order to this effect may indicate a brief of the charges under investigation. If it is decided that inter-connected Agencies would also come within the ambit of the order of suspension, the same should be specifically stated in the order. The order of suspension would operate for a period not more than six months and may be communicated to the Agency as also to the Investigating Department. The Investigating Department may ensure that their investigation is completed and whole process of final order is over within such period.

5.2 The order of suspension shall be communicated to all Commercial Departmental Heads. During the period of suspension, no business dealing may be held with the Agency.

5.3 As far as possible, the existing contract(s) with the Agency may continue unless the Competent Authority, having regard to the circumstances of the case, decides otherwise.

5.4 If the gravity of the misconduct under investigation is very serious and it would not be in the interest of MDL, as a whole, to deal with such an Agency pending investigation, the Competent Authority may order suspension of business dealing with Agency and send his recommendation to Chief Vigilance Officer (CVO), MDL along with the material available, copy of which may be issued to the Agency concerned with intimation to CVO MDL. Such an order would operate for a period of six months from the date of issue.

5.5 If the Agency concerned asks for detailed reasons of suspension, the Agency may be informed that its conduct is under investigation. It is not necessary to enter into correspondence or argument with the Agency at this stage.

5.6 It is not necessary to give any show-cause notice or personal hearing to the Agency before issuing the order of suspension. However, if investigations are not complete in six month's time,

the Competent Authority may extend the period of suspension by another three months, during which period the investigations must be completed.

6. **Ground on which Banning of Business Dealings can be initiated**

6.1 If the security consideration, including questions of loyalty of the Agency to the State, so warrants;

6.2 If the Director / Owner of the Agency, proprietor or partner of the firm, is convicted by a Court of Law for offences involving moral turpitude in relation to its business dealings with the Government or any other public sector enterprises or MDL, during the last five years;

6.3 If there is strong justification for believing that the Directors, Proprietors, Partners, owner of the Agency have been guilty of malpractices such as bribery, corruption, fraud, substitution of tenders, interpolations, etc.;

6.4 If the Agency continuously refuses to return / refund the dues of MDL without showing adequate reason and this is not due to any reasonable dispute which would attract proceedings in arbitration or Court of Law;

6.5 If the Agency employs a public servant dismissed / removed or employs a person convicted for an offence involving corruption or abetment of such offence;

6.6 If business dealings with the Agency have been banned/blacklisted by Government Agencies/ Statutory bodies, DGQA, Defence Shipyards, DPSUs or with whom commercial transactions have been suspended for sufficient and justifiable reasons.
If the Agency having same promoters/Directors /Partners as the barred/blacklisted Company as at 6.6 above for the duration for which the barring/ blacklisting of sister concern persists.

6.7 If the Agency has resorted to Corrupt, fraudulent practices including misrepresentation of facts;

If the agency who had fraudulently dealt with the Company for pecuniary gains or had connived with dealing officers for mutual benefit.

6.8 If the Agency uses intimidation / threatening or brings undue outside pressure on the MDL or its official in acceptance / performances of the job under the contract;

6.9 If the Agency indulges in repeated and / or deliberate use of delay tactics in complying with contractual stipulations;

6.10 Wilful indulgence by the Agency in supplying sub-standard material irrespective of whether pre-despatch inspection was carried out by MDL or not;

6.11 Based on the findings of the investigation report of CBI / Police against the Agency for malafide / unlawful acts or improper conduct on his part in matters relating to the MDL or even otherwise;

6.12 Established litigant nature of the Agency to derive undue benefit;

6.13 Continued poor performance of the Agency in several contracts;

6.14 If the Agency misuses the premises or facilities of the MDL, forcefully occupies, tampers or damages the Company's properties including land, water resources, forests / trees, etc.

If the Agency who knowingly collude to defeat competition with the aim of deriving undeserved profit or gain from doing business with MDL.

(Note: The examples given above are only illustrative and not exhaustive. The Competent Authority may decide to ban business dealing for any good and sufficient reason).

7. **Banning of Business Dealings**

7.1 Decision to ban business dealings with any Agency would apply throughout the Company.

7.2 There shall be a Standing Committee to be appointed by the CMD which may include HOD of respective Commercial Section/Capital Works/OTS, HOD (M), rep of Legal Deptt. and OIC (SR&R) for processing the cases of "Banning of Business Dealings". The functions of the committee shall, inter-alia include:

a) To study the report of the Investigating Agency and decide if a prima-facie case for banning exists, if not, send back the case to the Competent Authority.
b) To recommend for issue of show-cause notice to the Agency by the concerned department.
c) To examine the reply to show-cause notice and call the Agency for personal hearing, if required.
d) To submit final recommendation to the Competent Authority for banning or otherwise.

7.3 If the Competent Authority is prima-facie of view that action for banning business dealings with the Agency is called for, a show-cause notice may be issued to the Agency as per paragraph 9.1 and an enquiry held accordingly.

8. **Removal from List of Approved Agencies - Suppliers / Contractors, etc.**

8.1 If the Competent Authority decides that the charge against the Agency is of a minor nature, it may issue a show-cause notice as to why the name of the Agency should not be removed from the list of approved Agencies - Suppliers / Contractors, etc.

8.2 The effect of such an order would be that the Agency would not be disqualified from competing in Open Tender Enquiries but LTE may not be given to the Agency concerned.

8.3 Past performance of the Agency may be taken into account while processing for approval of the Competent Authority for awarding the contract.

9. **Procedure for issuing Show-cause Notice**

9.1 In case where the Competent Authority decides that action against an Agency is called for, a show-cause notice has to be issued to the Agency. Statement containing the imputation of misconduct or mis-behaviour may be appended to the show-cause notice and the Agency should be asked to submit within 15 days a written statement in its defence.

9.2 If the Agency requests for inspection of any relevant document in possession of MDL, necessary facility for inspection of documents may be provided.

9.3 The Competent Authority may consider and pass an appropriate speaking order:

a) For exonerating the Agency if the charges are not established;

b) For removing the Agency from the list of approved Suppliers / Contactors, etc.

c) For banning the business dealing with the Agency.

9.4 If it decides to ban business dealings, the period for which the ban would be operative may be mentioned. The order may also mention that the ban would extend to the interconnected Agencies of the Agency.

10. **Appeal against the Decision of the Competent Authority**

10.1 The Agency may file an appeal against the order of the Competent Authority banning business dealing, etc. The appeal shall lie to Appellate Authority. Such an appeal shall be preferred within one month from the date of receipt of the order banning business dealing, etc.

10.2 Appellate Authority would consider the appeal and pass appropriate order which shall be communicated to the Agency as well as the Competent Authority.

11. **Review of the Decision by the Competent Authority**

Any petition / application filed by the Agency concerning the review of the banning order passed originally by Competent Authority under the existing guidelines either before or after filing of appeal before the Appellate Authority or after disposal of appeal by the Appellate Authority, the review petition can be decided by the Appellate Authority upon disclosure of new facts / circumstances or subsequent development necessitating such review. The Competent Authority may refer the same petition to the separate Standing Committee which may be constituted by Appellate Authority for examination and recommendation.

12. **Circulation of the names of Agencies with whom Business Dealings have been banned**

12.1 Depending upon the gravity of misconduct established, the Competent Authority may direct HOD (Materials)/OIC (SR&R) to circulate the names of Agency with whom business dealings have been banned, to the Government Departments, other Public Sector Enterprises, etc. for such action as they deem appropriate.

12.2 If Government Departments or a Public Sector Enterprise request for more information about the Agency with whom business dealings have been banned, a copy of the report of Inquiring Authority together with a copy of the order of the Competent Authority / Appellate Authority may be supplied.

12.3 If business dealings with any Agency have been banned by the Central or State Government or any other Public Sector Enterprise, MDL may, without any further enquiry or investigation, issue an order banning business dealing with the Agency and its inter-connected Agencies.

Enclosure-14

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

RTGS/NEFT/ECS – MANDATE AUTHORISATION FORM

1.	NAME OF THE FIRM	:	
2.	CONTACT PERSON AND DESIGNATION	:	
3.	PAN NO	:	
4.	VENDOR ADDRESS	:	
5.	VENDOR'S TELEPHONE/FAX	:	
6.	E-MAIL ADRESS	:	
7.	BANK NAME	:	
8.	BANK ADDRESS	:	
9.	ACCOUNT NUMBER	:	
10.	ACCOUNT TYPE	:	
11.	IFSC CODE	:	
12.	MICR CODE	:	
13.	GST ID NO.	:	

We hereby declare that the particulars given above are correct and complete. If the transaction is delayed for reasons of incomplete or incorrect information, we would not hold MDL responsible.

Date **Vendor's Seal** **Authorised Signature of the Vendor**

Certified that the particulars as per Serial No. 1 & 6 to 12 are correct as per our records.

Date **Bank's Stamp** **Authorised Signature of the Bank Officer**

Enclosure-15

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

PROFORMA BANK GUARANTEE FOR BID BOND / EMD

(On Non-Judicial stamp paper of value ₹100/-)

IN CONSIDERATION OF MAZAGON DOCK SHIPBUILDERS LIMTED, a company incorporated under the Companies Act 1956 and having its registered office at Dockyard Road, Mumbai 400010 (hereinafter referred to as the "the Company" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) having agreed to accept the Earnest Money Deposit (EMD) of Rs---------- -------(Rupees----------only) in the form of Bank Guarantee from Messers ..... a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at .....(hereinafter called " the tenderer" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) for participating in the Tender no.....dated..... (hereinafter called "the tender" which expression shall include any amendments/alterations to "the tender" issued by "the Company") for the supply, delivery at site, installation and commissioning of certain equipment, item/services/civil works etc., We, ... Bank having office at ..... (hereinafter referred to as "the Bank" which expression shall include its successors and assigns) hereby agree to pay to the Company without any demur on first demand an amount not exceeding Rs..... (Rupees.....only) against any loss or damage, costs, charges and expenses caused to or suffered by the Company by reason of nonperformance and non-fulfilment or for any breach on the part of the tenderer of any of the terms and conditions of the said tender.

2. We, ... Bank further agree that the Company shall be sole judge whether the said tenderer has failed to perform or fulfil the said tender in terms thereof or committed breach of any terms and conditions of the tender the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Company on account thereof and we waive in the favour of the Company all the rights and defences to which we as guarantors may be entitled to.

3. We, ... Bank further agree that the amount demanded by the Company as such shall be final and binding on the Bank as to the Bank 's liability to pay and the amount demanded and the Bank undertake to pay the Company the amount so demanded on first demand and without any demur notwithstanding any dispute raised by the tenderer or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional.

4. We, ... Bank further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said tender/or to extend time of performance by the tenderer from time to time or to postpone for any time to time any of the powers exercisable by the Company against the tenderer and to forbear to enforce any of the terms and conditions relating to the tender and we shall not be relieved from our liability by reason of any such variation or extension

being granted to the tenderer or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the tenderer or by any such matter or things whatsoever which under the law relating to sureties would have the effect of relieving us.

5. We, ... Bank further undertake not to revoke this guarantee during its currency except with the previous consent of the Company in writing.

6. We, ... Bank also agree that the Bank's liability under this guarantee shall not be affected by any change in the constitution of the tenderer or dissolution or winding up of the business of the tenderer.

7. Notwithstanding anything contained herein above:

i) Our liability under this guarantee shall not exceed Rs.....
ii) This Bank Guarantee shall be valid upto and including .....; and
iii) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before .....(validity + --- weeks from the date of expiry of this guarantee).

8. This Guarantee shall be governed by Indian laws and the Courts at Mumbai, India shall have the exclusive jurisdiction.

IN WITNESS WHEREOF the Bank has executed this document on this..... day of .....

For ..... Bank
(by its constituted attorney
or the person authorised to sign)

(Signature of a person authorised
to sign on behalf of "the Bank")

Enclosure-16

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

PROFORMA FOR PERFORMANCE BANK GUARANTEE

(On Non-Judicial stamp paper of value ₹100/-)

IN CONSIDERATION OF MAZAGON DOCK SHIPBUILDERS LIMTED (formerly known as MAZAGON DOCK LIMITED, a company incorporated under the Companies Act 1956 and having its registered office at Dockyard Road, Mumbai 400010 (hereinafter referred to as the "the Company" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) having placed an order on Messers ..... a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at .....(hereinafter called " the Contractor" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) vide order No..... dated..... (hereinafter called "the order" which expression shall include any amendments/alterations to "the order" issued by "the Company") for the work of _____ _____as stated in the said Order and the Company having agreed that the Contractor shall furnish a security for the performance of the Contractor obligations and/or discharge of the Contractor liability in connection with the said order and the Company having agreed with the Contractor to accept a performance guarantee, We, ... Bank having office at ..... (hereinafter referred to as "the Bank" which expression shall include its successors and assigns) hereby agree to pay to the Company without any demur on first demand an amount not exceeding Rs..... (Rupees.....only) against any loss or damage, costs, charges and expenses caused to or suffered by the Company by reason of non-performance and non-fulfillment or for any breach on the part of the Contractor of any of the terms and conditions of the said order.

2. We, ... Bank further agree that the Company shall be sole judge whether the said Contractor has failed to perform or fulfill the said order in terms thereof or committed breach of any terms and conditions of the order and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Company on account thereof and we waive in the favour of the Company all the rights and defences to which we as guarantors may be entitled to.

3. We, ... Bank further agree that the amount demanded by the Company as such shall be final and binding on the Bank as to the Bank's liability to pay and the amount demanded and the Bank undertake to pay the Company the amount so demanded on first demand and without any demur notwithstanding any dispute raised by the Contractor or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this guarantee being absolute and unconditional.

4. We, ... Bank further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said order/or to extend time of performance by the Contractor from time to time or to postpone for any time to time any of the powers exercisable by the Company against the Contractor and to forbear to enforce any of the terms and conditions relating to the order and we shall not be relieved from our liability by reason of any such variation or extension

being granted to the Contractor or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the Contractor or by any such matter or things whatsoever which under the law relating to sureties would have the effect of relieving us.

5. We, ... Bank further undertake not to revoke this guarantee during its currency except with the previous consent of the Company in writing.

6. We, ...Bank also agree that the Bank's liability under this guarantee shall not be affected by any change in the constitution of the Contractor.

7. Notwithstanding anything contained herein above:
   i) Our liability under this guarantee shall not exceed Rs.....
   ii) This Bank Guarantee shall be valid upto and including .....; and
   iii) We are liable to pay the guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before .....(validity + ---weeks from the date of expiry of this guarantee).

8. This Guarantee shall be governed by Indian laws and the Courts at Mumbai, India shall have the exclusive jurisdiction.

IN WITNESS WHEREOF the Bank has executed this document on this..... day of .....

For ..... Bank
(by its constituted attorney)

(Signature of a person authorised
to sign on behalf of "the Bank")

Enclosure-19

Note: Enclosure 19 is attached separately

Enclosure-21

BRIEF SCOPE OF WORK:

Work consists of new work and renovation of office premises, substations, industrial sheds, ware houses, residential areas, and power supply arrangement for machinery

1. Electrical work for Renovation of office premises & residential areas which include SITC of point wiring, power supply, Data, Telephone point on work stations, cabins and other office area, light fixtures, indoor and outdoor lighting (Solar Lighting), ceiling and wall fan, power supply arrangement, Electrical and electronic appliances LAN and its accessories, network switches, racks. Laying of wires, Telephone Cables, Data Cables, Fibre Optic Cables and power cables, raceways etc.

2. Electrical work for renovation of Substations which includes SITC of laying of new HT/LT Cables, Power supply distribution panels, LT Switch Gears, metering cubicles and associated civil work such as excavation, trenches etc.

3. Electrical work for renovation of Industrial Sheds which includes SITC of industrial switch sockets, power distribution boards, lighting work, cable laying, power supply arrangement for machinery, tray fitment and necessary fabrication work for same etc.

4. Renovation of Warehouses which includes power distribution, lighting work, cable laying, industrial fans etc.

6. SITC of Earthing systems of all types and lightning arrestor system.

7. In addition to above all other electrical repair and renovation works which will be carried out in MDL premises located at Dockyard road, Sewree & Anik Chembur, Gavan Land, Nhava Yard and Residential Quarters at MDL Premises, Quarters at Navi Mumbai and Naval Dockyard.

8. Skilled/unskilled labour:
a) Job assigned by TS dept. as per requirement received from user dept. where material is procured by MDL.
b) Manpower deputation log sheet will be jointly signed by TS Dept.& User/Requisition /Request issued dept.
c) Shift time /working time will be 0900Hrs to 1730Hrs.
d) Manpower will be used/utilised as & when basis only.
e) Billing will be done on actual quantity certification.

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORK

GENERAL TECHNICAL SPECIFICATIONS

ELECTRICAL WORK

CHAPTER-1

WIRING

1.1	Mains in Metal Conduit	WG-MA/MC
1.2	Mains in PVC conduit	WG-MA/PC
1.3	Bunch of Wires	WG-MA/BW
1.4	Mains on GI Bare wire	WG-MA/GB
1.5	Concealing of Conduits	WG-MA/CC
1.6	PVC Flexible/Rigid Conduits/Casing-n-capping	WG-MA/CON
1.7	Wiring Accessories	WG-MA/WA
1.8	Modular switches and Accessories	No Specs
1.9	Point wiring	WG-PW/PW
1.10	Telephone wiring & Accessories	WG-TW/TW
1.11	Telephone Accessories	WG-TW/TA
1.12	Computer Cabling	WG-COC
1.13	Networking Components	WG-COC/NWC
1.14	Networking Accessories	WG-COC/NAS

Chapter 1:WIRING (WG)

General:

All material shall be conforming to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall either carry valid 'Quality Control' certificate issued by the Chief Engineer (Elect), P.W. Dept. Maharashtra State Govt. as included in approved list.
Work shall be carried out as per the Method of Construction specified by BIS. If there is no reference for particular Method of Construction in IS, such work shall be carried out as per the approved Method of Construction specified in chapter 16 of P.W. Dept. Handbook.
Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.
Material shall be tested in approved Testing Laboratory and shall qualify the relevant tests as and when directed by Engineer In-Charge.

Recommended Standards:

The following list is showing Indian Standards, which are acceptable as good practice, and accepted standards.

IS 732: 1989	Code of Practice for Electrical Wiring Installations?
IS 4648: 1968	Guide for Electrical Layout in residential buildings
IS 9537 (Part 1): 1980	Conduits for Electrical Installations: General requirements
IS 9537 (Part 2): 1981	Rigid Steel Conduits
IS 9537 (Part 3): 1983	Rigid Plain Conduits of insulating material
IS 3419: 1989	Specifications for fittings for rigid non metallic conduits
IS 694:	PVC insulated cables for working voltages up to and including 1100V
IS 1554 (Part 1): 1988	PVC insulated (heavy-duty) electric cables for working voltages up to and including 1100V
IS 3961 (Part 5): 1968	Recommended current ratings for cables: PVC insulated light duty cables.
IS 4288: 1988	PVC insulated (heavy duty) electric cables with solid aluminium conductors for voltages up to and including 1100V
IS 14772: 2000	Specifications for Accessories for household and similar fixed Electrical Installations
IS 3043: 1987	Code of practice for Earthing
SP 30: 1984	National Electrical Code
SP 7 (Group 4): 2005	National Building Code
IS 14927(Part 1): 2001	Cable Trunking and Ducting systems for electrical installations.

1.1 Conduits / Trunking (Casing Capping) (Surface type)

1.1.1 PVC Conduits

Specification No :(WG-MA/CON)

Scope:

PVC Conduits: Surface

Providing specified PVC Conduits and erecting as per approved Method of Construction; on surface of wall / ceiling, etc. including entries through walls / slabs / flooring as per requirement, and with all necessary hardware, accessories such as Spacers, Saddles, Bends, Tees, Junction boxes, Check-nuts, etc.; making conduits erection work rigid and duly finishing, removing debris from site.

Material:

PVC Conduit:

PVC pipe minimum 20mm dia and above depending on No. of wires to be drawn (refer Table No. 1/2) ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, etc.

Method of Construction:

Erection PVC Conduits for Surface type wiring:

General:

Erection shall be done as per the final approved layout, in perfect level and plumb. Conduits shall be firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, junction boxes, couplings, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm, round headed screws for fixing saddles on spacers. In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers. Distance between 2 spacers shall not be more than 600mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. 1/2 for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm. or ant electrostatic partition/separate pipe should be used. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface and with colour coding conduit (For visual identification) as per Table No. 1/4. Flexible conduits shall be used at expansion joints.

Especially for PVC Conduits of surface type wiring:

In addition to general instructions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, it shall be done with bending spring. Size of conduit shall be as per Table No. ½ for number of wires to be drawn through the conduit.

1.1.2 PVC Trunking (Casing capping)

Specification No (WG-MA/CON)

Scope:

PVC Trunking:

Providing specified PVC Trunking (Casing capping) and erecting as per approved Method of Construction, on surface of wall / ceiling, etc. including entries made with PVC conduit through walls / slabs / flooring as per requirement with all necessary hardware, accessories

such as inner / outer Elbows, Tees, Junction boxes, etc. and duly finishing, removing debris from site.

Material:

PVC Trunking (casing capping):

PVC Trunking (casing capping) ISI mark, 1.2 mm thick, minimum 20 mm width and above depending on No. of wires to be drawn (Refer Table No 1/3 for the size of trunking and number of wires to be drawn); with double locking arrangement, 1.8mm thick push-fit joints/ accessories for PVC trunking such as couplers, elbows, internal / external angles, junction boxes of required ways of the same make.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, etc.

Method of Construction:

Erection of PVC Trunking for surface type wiring:

Erection shall be done as per the final approved layout. The Trunking shall be in perfect level and plumb. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of stonewalls wooden gutties shall be grouted in wall for fixing of screws of Trunking. Distance between 2 screws shall not be more than 600 mm. Size of Trunking shall be correct depending on number of wires to be drawn as per Table No 1/3 but not less than 20mm. Separate Trunking shall be used for each phase in single phase distribution and for power and light distribution and also for wiring of other utilities like data, telephone, TV cabling and distance of 300 mm shall be maintained between the Trunking or anti electrostatic partition to be provided. Double locking shall be checked while fixing capping. Adequate use of accessories shall be made at joints and at required locations.

1.1.3 Rigid Steel Conduits

Specification No (WG-MA/CON)

Scope:

Rigid Steel Conduits: Surface

Providing specified Rigid Steel Conduits and erecting as per approved Method of Construction; on surface of wall / ceiling, etc including entries through walls / slabs / flooring as per requirement along with continuous earth wire, earth-clips and all necessary hardware, accessories; such as; spacers, saddles, Bends, Tees, Junction boxes, Check-nuts, etc. and duly finishing, removing debris from site.

Material:

Rigid Steel conduit:

Rigid steel conduit minimum 20mm dia and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint including inspection type or normal accessories such as, 5mm thick 20mm width spacers and G.I. saddles for individual pipe or GI strip for bunch of pipe, sockets, open bends, junction boxes of required ways all of the same make.

Earth continuity wire:

GI wire of 2.5 Sqmm; GI earth clips 22g, 10mm width, for fixing earth wire along the conduits.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, PVC/ rubber bushings etc.

Method of Construction:

Erection of Rigid steel Conduits:

General:

Erection shall be done as per the final approved layout, in perfect level and plumb. Conduits shall be duly screwed and firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, junction boxes, couplings, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm round headed for fixing saddles on spacers. In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers and saddles. Distance between 2 spacers shall not be more than 600mm. Separate pipe shall be used for each phase in single phase distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm or anti electrostatic partition to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No 1/4. Flexible conduits shall be used at expansion joints. Bushing shall be provided at open ends.

Erection of Rigid steel Conduits:
Especially for Rigid Steel Conduit of surface type wiring
In addition to general conditions above, Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. 1/1 for steel conduits). All exposed threaded portion of Rigid Steel Conduits shall be painted with anti corrosive paint. Sharp edges at cut ends shall be made smooth by removing burr. Inspection type conduits accessories shall be used as per requirement in accessible position to facilitate drawing or withdrawing of wires. All conduits piping work shall be properly Earthed with 2.5 sq. mm G.I Earth wire fixed to conduit and made continuous with Earth clips at every 1m and at ends and joints viz. bends, junction boxes.

Testing:
Earth continuity:
Earth continuity shall be ensured at termination points of Earth wire, and between the ends of Rigid steel conduit.
Polarity:
Polarity test and should be done including confirmation of phase entry in switch only.

Mode of Measurement:
Measurement shall be carried out on the basis per running meter length of conduit / Trunking.

1.2 Conduits (Concealed type)

Specification No (WG-MA/CC)

1.2.1 Concealing PVC Conduits in RCC work

Scope:
Providing specified PVC conduit and laying / erecting in RCC work, such as slab, beam, column before casting as per approved Method of Construction along with of all required material including hardware, binding wire, fish wire; accessories such as deep / long neck PVC junction boxes, PVC / MS junction / draw-in boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, removing debris from site and supervising the work during casting to confirm rigidity, continuity and avoid damages.

Material:

PVC Conduit:

PVC pipe of minimum 20mm dia and above depending on No. of wires to be drawn (refer Table No.1/2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; Couplers, long Bends, deep Junction boxes of required ways and resin / adhesive to make all joints rigid.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; PVC or fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plates on it.

Hardware:

'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire, steel fish wire etc.

Method of Construction:

Concealing of PVC conduits:

General:

Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in single phase distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All PVC conduit bending shall be done with Bending Spring. All joints shall be made rigid with resin.

Concealing of PVC conduits:

In RCC work:

Work shall be commenced after fixing of steel re-enforcement on centering material. Conduits shall be firmly fixed on steel of RCC work by binding wire. Fixing of conduits shall be such that it will remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RC work especially in beams. Suitable steel fish wire shall be drawn through in the conduits for drawing of wires later on.

1.2.2 Concealing PVC Conduits in walls / flooring

Scope:

Providing specified PVC conduit and erecting / laying in wall, flooring by making chases / grooves / entries as per approved Method of Construction along with of all required material including hardware such as 'U' nails, binding wire, fish wire; accessories such as PVC / MS junction boxes / inspection boxes, check-nuts, flexible PVC pipe, glands, drawing fish-wires and making all piping rigid, refinishing the surface with cement mortar, removing debris from site.

Material:

PVC Conduit:

PVC pipe minimum 20mm dia and above depending on No. of wires to be drawn (refer Table No.1/2), ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make

that of pipe; Couplers, long Bends, Junction boxes of required ways, type and resin / adhesive to make all joints rigid.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; PVC or fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plate on it.

Hardware:

'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, steel fish wire, etc.

Other material for Surface finishing: **Cement, sand, putty, and water.**

Method of Construction:

Concealing of PVC conduits: (General)

Work shall be done in co-ordination with civil work to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. for which the distance between pipes shall not be less than 300 mm or anti electrostatic partition is be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No.1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done with Bending Spring. All joints shall be made rigid with resin.

Concealing of PVC Conduits In walls / flooring:

Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the wall surface shall be done. Work in flooring shall not disturb RCC work, Conduits of adequate size shall be erected with use of appropriate accessories, and 'U' nails. All joints shall be made rigid with resin. Draw-in / inspection boxes shall be fixed with check-nut, flush with surrounding surface and earthed.

1.2.3 Rigid Steel Conduits in RCC work

Specification No (WG-MA/CC)

Scope:

Concealing of Rigid Steel Conduits:

In RCC work:

Providing specified Rigid Steel conduit and laying / erecting in RCC work, such as slab, beam, column before casting as per approved Method of Construction along with continuous earth wire and all required material including earth clips, hardware, binding wire, fish wire; accessories such as deep junction boxes, MS draw-in / junction / inspection boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, removing debris from site and supervising the work during casting to confirm rigidity, continuity and avoid damages.

Material:

Rigid Steel conduit:

Rigid HG steel screwed conduit, minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as

check nuts, long bends, deep junction boxes for slab, regular junction boxes for walls; of required ways, all of the same make.

Earth continuity wire:

GI wire of 2.5 sq. mm; GI earth clips 22g, 10mm width, for fixing earth wire along the conduits.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plate on it.

Hardware:

U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, fish wire, etc

Method of Construction:

Concealing of Rigid steel Conduits:

General:

Work shall be done in co-ordination with civil work to suite final approved layout. Conduit shall be duly screwed and size of conduit shall be correct depending on number of wires to be drawn. (Table No.1/1, for Steel conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. for which distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For visual identification). Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done approved manner without changing the cross-section.

In RCC work:

Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed with steel in slab by binding wire. Fixing of conduits shall be possibly done with welding tags so that it will remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through the conduits for drawing of wires later on.

1.2.4 Rigid steel Conduits in walls / flooring

Specification No (WG-MA/CC)

Scope:

Concealing of Rigid steel Conduits:

In walls / flooring:

Providing specified Rigid Steel Conduits and erecting in wall, flooring by making chases / grooves / entries as per approved Method of Construction along with continuous earth wire and all required material including earth clips hardware such as 'U' nails, binding wire, fish wire; accessories such as MS junction / inspection boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, refinishing the surface with cement mortar, removing debris from site.

Material:

Rigid Steel conduit:

Rigid steel HG conduit minimum 20mm dia. and 16 gauge, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as check nuts, long bends, deep junction boxes for flooring, regular junction boxes for walls; of required ways all of the same make.

Earth continuity wire:

GI wire of 2.5 sq. mm, GI earth clips 22g, 10mm width, for fixing earth wire along the conduits.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; fabricated from 16 SWG CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plates on it.

Hardware:

'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, GI fish wire, etc.

Other material for Surface finishing: **Cement, sand, putty and water.**

Method of Construction:

Concealing of Rigid Steel Conduits:

General:

Work shall be done in co-ordination with civil work to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No.1/1, for Steel conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc; for which the distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25 metre, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done approved manner without changing the cross-section.

Concealing of Rigid Steel Conduits in walls/ flooring:

Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the wall surface shall be done. Work in flooring shall not disturb RCC work, Conduits of adequate size shall be erected with use of appropriate accessories, and hardware like 'U' nails, etc. Draw-in / inspection boxes shall be fixed with check-nut, flush with surrounding surface and earthed.

Testing:

Earth continuity:

Earth continuity shall be ensured at termination point of Earth wire, between the ends of metal conduit.

Mode of Measurement:

Measurement shall be carried out on the basis per running meter length of conduit.

1.3 **Bunch of wires:**

Specification No (WG-MA/BW)

Scope:

Bunch of wires:

Providing specified wires and drawing them through provided conduits / trunking and / or as directed; with coded ferrules, harnessing the bunch of wires with necessary material when used in panel boards, duly connecting / terminating with lugs, and testing for safety and beneficial use.

Material:

Wires: in conduits / trunking / panel boards

Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5.

Wires: open

PVC insulated and PVC sheathed wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5.

Earth Continuity Wire:

PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5.

Lugs: **Copper lugs of appropriate size & type**

Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of Construction:

Bunch of wires:

Drawing of wires: General

Specified wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only, with appropriate type and size of lugs.

Drawing of wires: through PVC conduits

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2.

Drawing of wires: through Rigid Steel conduits

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1.

Open Wire bunch: Open wires shall be erected with due care so as to avoid chances of any mechanical injury. Harnessing shall be done with required material in an approved manner in panel boards or where ever necessary. For covering lead wires flexible conduit shall be used with gland as per necessity.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured between termination points of Earth wire.

Polarity Test:

Test shall be carried out for ensuring the correct polarity in switch and plug.

Mode of Measurement:

Measurement shall be carried out on the basis per running meter length of single wire or bunch as specified.

1.4 Mains (surface type)

1.4.1 Mains in surface PVC conduit

Specification No (WG-MA/PC)

Scope:

Mains in surface PVC conduit:

Providing specified PVC Conduits, Wires and erecting the conduits as per approved Method of Construction; on surface of wall / ceiling, etc. including entries through walls / slabs / flooring as per requirement, and with all necessary hardware, accessories such as Spacers, Saddles, Bends, Tees, Junction boxes, Check-nuts / glands, etc.; making conduits erection work rigid; and drawing the specified wires through these conduits and duly connecting / terminating with lugs, complete finishing, removing debris from site; testing for safety and beneficial use.

Material:

PVC Conduit:

PVC pipe of minimum 20mm dia and above depending on No. of wires to be drawn (refer Table No 1/2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, etc.

Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires)

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of appropriate colour coding as per Table No 1/5

Earth Continuity Wire:

PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green or green yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5

Lugs: **Copper lugs of appropriate type and size.**

Other material: Rubber grommet, bush, flexible PVC conduit, gland etc.

Method of Construction:

Erection PVC Conduits for Surface type wiring:

General:

Erection shall be done as per the final approved layout, in perfect level and plumb. Conduits shall be firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, junction boxes, couplings, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm, round headed screws for

fixing saddles on spacers. In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers. Distance between 2 spacers shall not be more than 600 mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. ½ for PVC conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No. 1/4. Flexible conduits shall be used at expansion joints.

Especially for PVC Conduits of surface type wiring:

In addition to general instructions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, it shall be done with bending spring. Size of conduit shall be as per Table No. 1/2 for number of wires to be drawn through the conduit.

Drawing of wires: General

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phase shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with appropriate type and size of lugs.

Drawing of wires: through PVC conduits for surface type wiring

Insulated Earth wire of green or green-yellow colour of minimum 2.5 sq mm or as per specified shall be drawn through conduit. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2. At the termination end flexible PVC conduit shall be used with gland as per required.

1.4.2 Mains in PVC Trunking (casing capping)

Specification No (WG-MA/PC)

Scope:

Surface type Mains in PVC Trunking (casing capping)

Providing specified PVC Trunking, Wires and erecting the Trunking as per approved Method of Construction; on surface of wall / ceiling, etc. including entries made with PVC conduit through walls / slabs / flooring as per requirement with all necessary hardware, accessories such as inner / outer Elbows, Tees, Junction boxes, etc; including erection of specified wires in PVC trunking, with coded ferrules and duly connecting with lugs, and finishing, removing debris from site; testing for safety and beneficial use.

Material:

PVC Trunking:

PVC Trunking (casing capping) ISI mark, 1.2 mm thick, minimum 20 mm width and above depending on No. of wires to be drawn (Refer Table No 1/2 for the size of trunking and number of wires to be drawn); with double locking arrangement, 1.8mm thick push-fit joints/ accessories for PVC trunking such as couplers, elbows, internal / external angles, junction boxes of required ways of the same make.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, etc.

Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires)

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5

Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green colour, ISI marked, of specified size but not less than 1.5 Sqmm as per Table No 1/5
Lugs: Copper lugs of appropriate type and size.
Other material: Flexible PVC conduit, gland coded ferrules, etc.

Method of Construction:

Erection of PVC Trunking for surface type wiring
Erection shall be done as per the final approved layout. The Trunking shall be in perfect level and plumb. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing. In case of unleveled surface number and size of screws shall be changed to higher size as per requirement and in case of stonewalls wooden gutties shall be grouted in wall for fixing of screws of Trunking. Distance between 2 screws shall not be more than 600 mm. Size of Trunking shall be correct depending on number of wires to be drawn as per Table No 1/3 but not less than 20mm. Separate Trunking shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring of other utilities like data, telephone, TV cabling and distance of 300 mm shall be maintained between the Trunking or anti electrostatic partition is to be provided. Double locking shall be checked while fixing capping. Adequate use of accessories shall be made at joints and required locations.

Erecting wires in Trunking:

Wires shall be erected within Trunking with adequate care. Correct colour coding as per Table No. 1/5 shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be erected in single Trunking. Wires shall be terminated in the terminals of accessories only, with appropriate type and size of lugs. Insulated Earth wire of green or green-yellow colour of minimum 2.5 sq mm or as per specified shall be erected through Trunking. Number of wires shall not exceed with respect to size of Trunking as per Table No. 1/3. After erection of wires double locking shall be checked while fixing capping. At the termination end flexible PVC conduit shall be used with gland as per required.

1.4.3 Mains in Rigid steel conduit (Surface type)

Specification No (WG-MA/MC)

Scope:
Surface type Mains in Rigid steel conduit:
Providing specified Rigid Steel Conduits and erecting as per approved Method of Construction; on surface of wall / ceiling, etc including entries through walls / slabs / flooring as per requirement along with continuous earth wire, earth-clips and all necessary hardware, accessories; such as; spacers, saddles, Bends, Tees, Junction boxes, Check-nuts, etc; and drawing the specified wires through these conduits in approved manner; with coded ferrules and duly connecting with lugs, and duly finishing, removing debris from site; testing the installation for safety and beneficial use.

Material:

Rigid Steel conduit:

Rigid steel HG screwed conduit minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as 5 mm thick 20mm width spacers and G.I. saddles, sockets, open bends, junction boxes of required ways all of the same make.
Earth continuity wire:
GI wire of 2.5 sq. mm GI earth clips 22g, 10mm width, for fixing earth wire along the conduits.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, PVC/ rubber bushings etc.

Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires): PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pit (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5

Earth Continuity Wire:

PVC insulated wire minimum FR grade insulation copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, of green / green-yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5

Lugs: **Copper lugs of appropriate size & type**

Other material: Rubber Bush, Flexible metal conduit, gland etc.

Method of Construction:

Erection of Rigid Steel Conduits:

General:

Erection shall be done as per the final approved layout, in perfect level and plumb. Conduits shall be duly screwed and firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, junction boxes, couplings, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm round headed for fixing saddles on spacers. In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers and saddles. Distance between 2 spacers shall not be more than 600mm. Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. 1/1 for steel conduits). Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No 1/4. Flexible conduits shall be used at expansion joints. Bushing shall be provided at open ends.

Erection of rigid steel Conduits:
Specially for Rigid Steel Conduit of surface type wiring:
In addition to general conditions above, Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. 1/1 for steel conduits). All exposed threaded portion of Rigid Steel Conduits shall be painted with anti corrosive paint. Sharp edges and burr at cut ends shall be made smooth. Inspection type conduits accessories shall be used as per requirement in accessible position to facilitate drawing or withdrawing of wires. All conduits, piping work shall be properly earthed with 2.5 Sqmm G.I Earth wire duly fixed to conduit and made continuous with Earth clips at every 1m and at ends and joints viz. bends, junction boxes.

Drawing of wires:

General:

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5 shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with correct type of and correct size of lugs.

Drawing of wires:

Through Rigid Steel conduits for surface type wiring:

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1. At the termination end flexible metal conduit shall be used with gland.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at all earth terminals and at earth terminals of metal enclosures.

Polarity test:

Polarity test shall be carried out for ensuring polarity in switch and plug.

Mode of Measurement:

Measurement shall be carried out on the basis per running meter of pipe length.

1.5 Mains (Concealed type)

1.5.1 Mains in PVC Conduits in RCC work

Specification No (WG-MA/CC, WG-MA/BW)

Scope:

Concealed Mains in PVC Conduits in RCC work:

Providing specified PVC conduit, wires and laying / erecting Conduits in RCC work, such as slab, beam, column before casting as per approved Method of Construction along with of all required material including hardware, binding wire, fish wire; accessories such as deep PVC junction boxes, PVC / MS junction boxes / inspection boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, removing debris from site and supervising the work during casting to confirm rigidity, continuity and avoid damages and as and when directed drawing of specified wires through these conduits with fish wire, tagging with coded ferrules and duly connecting with lugs, complete testing the installation for safety and beneficial use.

Material:

PVC Conduit:

PVC pipe of minimum 20mm dia and above, depending on number of wires to be drawn (refer Table No 1/2, ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; Couplers, long Bends, deep Junction boxes of required ways and resin / adhesive to make all joints rigid.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; PVC or fabricated from 16 SWG CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plates on it.

Hardware:

'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, GI fish wire, etc.

Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5

Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green-yellow colour, ISI marked, of specified size but not less than 1.5 Sqmm as per Table No 1/5

Lugs: **Copper lugs of required size & type**

Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of Construction:

Concealing of PVC conduits:

General:

Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No. 1/1 for Steel conduits & Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All PVC conduit bending shall be done with Bending Spring. All joints shall be made rigid with resin.

Concealing of PVC conduits:

In RCC work:

Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed on steel of RCC work by binding wire. Fixing of conduits shall be such that it will remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and at located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through in the conduits for drawing of wires later on.

Drawing of wires:

General:

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5 sha be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with appropriate type and size of lugs.

Drawing of wires:
Through PVC conduits:
Insulated Earth wire of green or green-yellow colour of minimum 2.5 sq mm or as per specified shall be drawn through pipe. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2.

1.5.2 Concealed Mains in PVC Conduits in walls / flooring:

Specification No (WG-MA/CC)

Scope:

Concealed Mains in PVC Conduits in walls / flooring:

Providing specified PVC conduit, Wires and laying / erecting the conduits in wall, flooring by making chases / grooves / entries as per approved Method of Construction along with of all required material including hardware such as 'U' nails, binding wire, fish wire; accessories such as PVC / MS junction boxes / inspection boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, refinishing the surface with cement mortar, removing debris from site and as and when directed drawing of specified wires through these conduits with fish help of wire, tagging by coded ferrules and duly connecting / terminating with lugs, complete testing the installation for safety and beneficial use.

Material:

PVC Conduit:

PVC pipe minimum 20mm dia and above depending No. of wires to be drawn (refer Table No1/2, ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; Couplers, long Bends, Junction boxes of required ways and resin / adhesive to make all joints rigid.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; PVC or fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plate on it.

Hardware:

'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, steel fish wire, etc.

Other material for Surface finishing: **Cement, sand, putty and water.**

Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):

PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic tough pitch (ETP) grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5

Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green-yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5

Lugs: **Copper lugs of appropriate size & type**

Other material for wire drawing: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of Construction:

Concealing of PVC conduits:

General:

Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No. 1/1 for Steel conduits & Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done with Bending Spring. All joints shall be made rigid with resin.

Concealing of PVC Conduits In walls / flooring:
Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the wall surface shall be done. Work in flooring shall not disturb RCC work. Conduits of adequate size shall be erected with use of appropriate accessories, and 'U' nails. All joints shall be made rigid with resin. Draw-in / inspection boxes shall be fixed with check-nut, flush with surrounding surface and earthed.

Drawing of wires:

General:

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5 shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with correct type of and correct size of lugs.

Drawing of wires:
Through PVC conduits:
Insulated Earth wire of green or green-yellow colour of minimum 2.5 sq mm or as per specified shall be drawn through pipe. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2. At the termination end flexible PVC conduit shall be used with gland as per necessity.

1.5.3 Concealed Mains in Rigid Steel Conduits in RCC work

Specification No (WG-MA/CC, WG-MA/BW)

Scope:

Concealed Mains in Rigid Steel Conduits in RCC work:
Providing specified PVC conduit, Wires and laying / erecting the conduits in RCC work, such as slab, beam, column before casting as per approved Method of Construction along with continuous earth wire and all required material including earth clips, hardware, binding wire, fish wire; accessories such as deep PVC junction boxes, PVC / MS junction boxes / inspection boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, removing debris from site and supervising the work during casting to confirm rigidity, continuity and avoid damages and as and when directed drawing of wires through these conduits with fish wire, ferruling by coding tags and duly connecting with lugs, complete testing the installation for safety and beneficial use.

Material:

Rigid Steel conduit:

Rigid HG steel screwed conduit minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as check nuts, long bends, deep junction boxes for slab, regular junction boxes for walls; of required ways all of the same make.

Earth Continuity wire:

GI wire of 2.5 sq. mm 22g 10mm width, GI earth clips for fixing earth wire along with the conduits.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; fabricated from 16 SWG CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plates on it.

Hardware:
'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, steel fish wire, rubber / PVC bushes etc.
Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):
PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5
Earth Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green-yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per Table No 1/5
Lugs: Copper lugs of required size & type.
Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of Construction:
Concealed Mains in Rigid Steel Conduits in RCC work:

Concealing of conduits:

General:

Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No1/1, for Steel conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the final approved layout, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25 m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done approved manner without changing the cross-section.

Concealing of conduits:

In RCC work:

Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed with steel in slab by binding wire. Fixing of conduits shall be possibly done with welding tags so that it will remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through the conduits for drawing of wires later on.

Drawing of wires:

General:

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5 shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided

and shall be terminated in the terminals of accessories only, with correct type of and correct size of lugs.

Drawing of wires:
Through Rigid Steel conduits:
Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1

1.5.4 Mains in Rigid steel Conduits in walls / flooring

Specification No (WG-MA/CC, WG-MA/BW)

Scope:

Concealed Mains in Rigid Steel Conduits in walls / flooring:

Providing specified Metal conduit, Wires and erecting in wall, flooring by making chases / grooves / entries as per approved Method of Construction along with continuous earth wire and all required material including earth clips hardware such as 'U' nails, binding wire, fish wire; accessories such as MS junction / inspection boxes, check-nuts, flexible PVC pipe, drawing fish-wires and making all piping rigid, refinishing the surface with cement mortar, removing debris from site and as and when directed drawing of wires through these conduits with fish wire, ferruling by coding tags and duly connecting with lugs, complet testing the installation for safety and beneficial use.

Material:

Rigid Steel conduit:

Rigid HG steel screwed conduit minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as check nuts, long bends, deep junction boxes for flooring, regular junction boxes for walls; of required ways all of the same make.
Earth continuity wire: GI wire of 2.5 sq. mm 22g 10mm width, GI earth clips for fixing earth wire along with the conduits.

Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate and of suitable size to accommodate No. of entries; fabricated from 16 SWG CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall b knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix cover plates on it.
Hardware:
'U' nails, plumbing and general use nails of required sizes, washers, check-nuts, steel binding wire 20g, steel fish wire, rubber, PVC bushes etc.

Other material for Surface finishing: **Cement, sand, putty and water.**
Wires: Mains / Sub-mains / Circuit mains (comprising phase and neutral wires):
PVC insulated wire of specified size, minimum FR grade insulation, copper conductor of electrolytic grade, having insulation of 1.1 kV grade, ISI marked, of required colour coding as per Table No 1/5
Earth Continuity Wire: PVC insulated wire minimum FR grade insulation copper conductor of electrolytic grade, having insulation of 1.1 kV grade, of green / green-yellow colour, ISI marked, of specified size but not less than 2.5 Sqmm as per **Table No 1/5**.

Lugs: **Copper lugs of appropriate size & type**
Other material: Rubber grommet, bush, harnessing material, flexible conduit etc.

Method of Construction:

Concealed Mains in Metal Conduits in walls / flooring Concealing of conduits:

General:

Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No 1/1, for Steel conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm or anti electrostatic partition is to be provided. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All bending of conduits shall be done approved manner without changing the cross-section.

Concealing of Conduits in walls/ flooring:

Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the wall surface shall be done. Work in flooring shall not disturb RCC work. Conduits of adequate size shall be erected with use of appropriate accessories and hardware like 'U' nails, etc. Draw-in / inspection boxes shall be fixed with check-nut, flush with surrounding surface and earthed.

Drawing of wires:

General:

Wires shall be drawn with adequate care. Correct colour coding as per Table No. 1/5, shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped only within circuit. For lighting load or single-phase distribution wires of two different phases shall not be drawn in single pipe. Lead wires of sufficient extra length shall be provided and shall be terminated in the terminals of accessories only, with correct type of and correct size of lugs.

Drawing of wires:
Through Rigid Steel conduits:

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1. At the termination end flexible metal conduit shall be used with glands as per necessity.

Testing:
Insulation resistance test:

All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at all earth terminals and at earth terminals of metal enclosures.

Polarity Test:

Polarity test shall be carried out for ensuring correct polarity in plug and switch.

Mode of Measurement:

Measurement shall be carried out on the basis per running meter of pipe length.

1.6 ***Point wiring (Surface type)***

Specification No (WG-PW/SW)

Scope:

Point wiring (Surface type):

Providing all required approved specified material including hardware and erecting wiring on surface of wall, ceiling from switch board to outlet for light / fan / bell / independent plug point, in rigid steel / PVC conduit or PVC trunking as specified; fixing one board with a 1 way switch for one way point or two boards with a 2 way switch on each board, in case of 2 way point; for controlling power supply and one board / block with accessory for outlet of light / fan / plug and terminating wires within as per approved Method of Construction; removing all debris and testing the installation for safety and beneficial use.

Material:

Point wiring (Surface)

PVC conduit:

PVC pipe of minimum 20mm dia and above depending No. of wires to be drawn (refer Table No 1/2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, inspection or non inspection type Elbows, Tees, Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

PVC Trunking:

PVC Trunking (casing capping) ISI mark, 1.2 mm thick, minimum 20 mm width and above depending on No. of wires to be drawn (Refer Table No 1/2 for the size of trunking and number of wires to be drawn); with double locking arrangement, 1.8 mm thick push-fit joints / accessories for PVC trunking such as couplers, elbows, internal / external angles, junction boxes of required ways of the same make.

Rigid Steel conduit:

Rigid steel screwed conduit minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No. 1/1, 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as 5mm thick 20mm width spacers and G.I. saddles for individual pipe or GI strip for bunch of pipes, sockets, inspection type or normal; open bends, junction boxes of required ways all of the same make.

Wires: Phase and Neutral

PVC insulated wires of specified size, 1.1 kV, & minimum FR grade insulation, electrolytic tough pitch (ETP) copper conductor, ISI marked, of required colour coding as per Table No 1/5

Earth Wire:

PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation of 1.1 kV grade, of green / green-yellow colour, ISI marked, 2.5 Sqmm or bare copper wire of 14g

Accessories:

Switch: 1 or 2 way Piano type 6/10 A, 1 or 2 way Modular type switch 6/10A.
Outlet: 6A angle / batten lamp holder or 3 plate ceiling-rose or Bakelite / porcelain three way connector or if plug point, 6A, 3-pin plug socket.

Boards:

Switchboards shall be double walled (back and front) of suitable size, to accommodate independent slot for each switch, socket, fan regulator. Boards shall be made up of 4mm thick marine grade plywood for back and front fixed on wooden frame with 0.8mm thick laminate pasted on exposed portion of front ply, totally varnished and with either brass hinged door or screwed top.

Or

As above with 3mm thick Bakelite/Hylam top instead of laminated front ply.

Or

Board made from Filled polypropylene.
Round/Square double wooden block or PVC board for mounting light / fan outlet accessory.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs, wooden gutties, PVC/ rubber bushings etc.

Method of Construction:
Point wiring (Surface)

Erection of conduits:

General:

Erection shall be done as per the final approved layout, in perfect level and plumb. Conduits shall be duly screwed and firmly fixed on spacers with saddles. Fixing of spacers shall be equidistant and at ends, bends, elbows, junction boxes, couplings, boards. CSK screws of minimum 35x8 mm and suitable plugs shall be used for fixing spacers and 12x5 mm round headed for fixing saddles on spacers. In case of stonewalls wooden gutties shall be grouted in wall for fixing of spacers and saddles. Distance between 2 spacers shall not be more than 600mm. Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution. Also for wiring for other utilities like data, telephone, TV cabling distance between pipes shall not be less than 300 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of surface conduit with colour coding (For Visual identification) as per Table No 1/4. Flexible conduits shall be used at expansion joints. Bushing shall be provided at open ends.

Erection of conduits:

PVC pipes for surface type wiring:

In addition to General conditions above, all joints shall be made rigid with resin / adhesive. Wherever offsets are necessary, same shall be done with bending spring. Size of conduit shall be correct depending on number of wires to be drawn as per Table No. 1/2.

Or

Specially for Rigid Steel Conduit of surface type wiring:
In addition to general conditions above, Size of conduit shall be correct depending on number of wires to be drawn (as per Table No. 1/1 for steel conduits). All exposed threaded portion of Rigid Steel Conduits shall be painted with anti corrosive paint. Sharp edges and burr at cut ends shall be made smooth. Inspection type conduits accessories shall be used as per requirement in accessible position to facilitate drawing or withdrawing of wires. All conduits piping work shall be properly earthed with 2.5 sq. mm G.I Earth wire fixed to conduit and made continuous with Earth clips at every 1m and at ends and joints viz. bends, junction boxes.

Or

Erection of PVC Trunking for surface type wiring:
Erection shall be done as per the final approved layout. The Trunking shall be in perfect level and plumb. Screws of minimum 35x8 mm and suitable plugs shall be used for fixing.

In case of unleveled surface number and size of screws shall be changed to higher size as per requirement and in case of stonewalls wooden gutties shall be grouted in wall for fixing of screws of Trunking. Distance between 2 screws shall not be more than 600 mm. Size of Trunking shall be correct depending on number of wires to be drawn as per Table No 1/3 but not less than 20mm. Separate Trunking shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring of other utilities like data, telephone, TV cabling and distance of 300 mm shall be maintained between the Trunking. Double locking shall be checked while fixing capping. Adequate use of accessories shall be made at joints and required locations.

Drawing of wires: General

Wires shall be drawn with adequate care. Correct colour coding as per Table No 1/5 shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped within circuit. For lighting load distribution wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only. Insulated Earth wire of green or green-yellow colour of minimum 2.5 sq mm or as per specified shall be erected wherever necessary. In case of 2-way point wiring additional wires of phase conductor shall be provided between the 2-way switches.

Drawing of wires: through PVC conduits for surface type wiring

Insulated Earth wire of green or green-yellow colour of minimum 2.5 sq mm shall be drawn through pipe. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/2.

Or

Drawing of wires: through Rigid Steel conduits for surface type wiring

Bush shall be used at pipe opening to protect wire insulation from getting damaged due to burrs / sharp edges. Number of wires shall not exceed with respect to size of pipe as per Table No. 1/1.

Or

Erecting wires in Trunking:

Wires shall be erected within Trunking with adequate care. Number of wires shall not exceed with respect to size of Trunking as per Table No. 1/3. After erection of wires double locking shall be checked while fixing capping.

Fixing Switchboards and accessories:

Control switchboards shall generally be erected at 1.35m height or as specified and fixed with minimum 2 Nos. (and more as per size of board) of screws of length not less than 50mm, termination of wires shall be done with lugs on switch and other accessories only by carefully inserting all strands in lugs, terminals and proper tightening. Switches shall be provided on phase wire only. Bare wire shall not be used for looping incoming supply to switches and for earthing inside switchboards. For plug socket phase wire shall be connected in right side terminal when seen from front. Proper termination of earth wire in Earth terminal shall be ensured.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at all earth terminals of plug outlets and at earth terminals of metal enclosures.

Polarity test:

Polarity test shall be carried out for ensuing the correct polarity in switch and plug.

Mode of Measurement:

Measurement shall be carried out on the basis per number of points, **for the point length up to 6 metre between switch and outlet**. For the length exceeding 6 metre 10% of overall rate shall be added for every 1m.

1.7 **Point wiring (Concealed type)**

Specification No (WG-PW/CW)

Scope:

Point wiring (Concealed type):

Providing all required approved specified material including hardware and erecting rigid steel / PVC conduits, junction boxes, provided fan boxes, along with required accessories in RCC slabs before casting and in walls, flooring by making chases, and refilling the same after erection of conduits, fixing concealed type boxes for switch boards in walls, drawing wires through conduits, from switch board to outlet for light / fan / bell / independent plug point fixing modular type switch for controlling power supply and an accessory for outlet of light / fan / bell / plug at other end, with mounting plate, and terminating wires within at both ends, as per approved Method of Construction, closing all junction boxes with plates; removing all debris and testing the installation for safety and beneficial use.

Material:

Point wiring (Concealed):

PVC conduit:

PVC pipe of minimum 20mm dia and above depending No. of wires to be drawn (refer Table No 1 / 2); ISI mark, HMS grade (2mm thick), accessories for PVC pipes of the same make that of pipe; such as Spacers & Saddles, Couplers, Bends, deep / normal Junction boxes of required ways and resin / adhesive to make all joints rigid. Black pipe shall not be used for surface type wiring.

Rigid Steel conduit:

Rigid steel screwed conduit minimum 20mm dia. and higher depending on No. of wires to be drawn as per Table No.1/1, 16 gauge, ISI mark, ERW grade duly processed for anti-rust treatment and painted with black enamel paint, accessories for rigid steel conduits such as sockets, bends, deep / normal junction boxes of required ways all of the same make.

Sheet metal Junction boxes / Draw-in boxes:

Junction box shall be 5 sided with removable top plate, fabricated from 16g CRCA sheet steel with earth terminal duly treated with antirust treatment and painted with two coats of red oxide paint. There shall be knockout holes in required numbers and dia. for entry of conduit pipes and arrangement to fix surface cover plate on it. Cover plate shall be made up of fire resistant PVC material / 3mm thick laminate / Bakelite / Hylam / transparent acrylic sheet painted from inside to match colour of wall with duly tapered edges.

Wires: phase and neutral wires

PVC insulated wires of specified size, 1.1 kV, & minimum FR grade insulation, electrolytic tough pitch (ETP) copper conductor, ISI marked, of required colour coding as per Table No 1/5

Earth Continuity Wire:

PVC insulated minimum FR grade copper wires of electrolytic grade, having insulation of 1.1 kV grade, of green colour, ISI marked, 2.5 Sqmm or bare copper wire of 14g

Lugs: Pin type Copper lugs.

Accessories:

Switch: 1 or 2 way Modular type switch 6/10A.

Outlet:

Modular type 6A angle / batten lamp holder or 3 plate ceiling-rose or Bakelite / porcelain 3 way connector or if plug point, 6A, 3-pin plug shuttered socket.

Boards:

Switchboards shall comprise of; concealed type box of required modules made of sheet metal or Polypropylene material, mounting plate and cover plate. The required modules

shall be worked out on the basis of points, plug socket/sockets, step type fan regulator, etc are to be fixed. For every blank module, 1 way blank plate shall be fixed. All the above accessories shall be of same make, as that of switch.

Hardware:

Sheet Metal (SM) screws of sizes specified in Method of Construction, washers, rawl / PVC / fill type plugs / wooden gutties, 'U' nails, plumbing nails, steel binding wire, fish wire 20g, rubber / PVC bushes etc.

Other material for Surface finishing: Sand, Cement, water etc.

Method of Construction:

Point wiring (Concealed):

Concealing of conduits:

General:

Work shall be done in co-ordination with civil work and to suite final approved layout. Size of conduit shall be correct depending on number of wires to be drawn. (Table No. 1/1 for Steel conduits & Table No 1/2 for PVC conduits) Separate pipe shall be used for each phase in 1-ph distribution and for power and light distribution and also for wiring for other utilities like data, telephone, TV cabling, etc. The distance between pipes shall not be less than 300 mm. Adequate use of conduit accessories shall be made at required locations. Entries in wall shall be at level of corresponding conduit with colour coding as per Table No. 1/4. (For Visual identification) Flexible conduits shall be used at expansion joints. Erection shall be done as per the layout finalized, with minimum sharp bends, with junction boxes at angular junctions and for straight runs at every 4.25m, in such manner so as to facilitate drawing of wires. All the bends shall be done with Bending Spring.

Concealing of conduits: In RCC work

Work shall be commenced after fixing of steel (re-enforcement) on centering material. Conduits shall be firmly fixed on steel of RCC work by binding wire. Fixing of conduits shall be such that it will remain rigid during casting of slab, beam, and column even after use of vibrator. Deep junction boxes and other draw-in boxes shall be such that their open end and centering material will not have gap in between so as to avoid concrete entering inside even after fixing covers to steel re-enforcement; and be filled with dry sand. Open ends of conduits; to be concealed in walls, shall be provided with couplers / sockets at ends and be flush with bottom of beam, and at located at the center of the beam. As far as possible bunching / grouping of conduits shall be avoided so that it will not affect strength of RCC work especially in beams. Suitable steel fish wire shall be drawn through in the conduits for drawing of wires later on.

Concealing of Conduits: In walls

Chases shall be made in walls of adequate width, with cutter and chiseling through it. Necessary finishing of the surface shall be done. Conduits of adequate size shall be erected with use of appropriate accessories and 'U' nails.

Drawing of wires:

Use of Steel fish wire shall be made for drawing of wires. Wires shall be drawn with adequate care. Correct colour coding shall be used for phase, neutral and earth. Wires shall not have intermediate joint in between terminals of the accessories. Earth-wire and Return wire (neutral) may be looped within circuit only. For lighting load distribution, wires of two different phases shall not be drawn in single pipe. Wires shall be terminated in the terminals of accessories only. Adequate extra length shall be left at termination points. In case of 2-way point wiring additional wires of phase conductor shall be provided between the 2-way switches.

Fixing Switchboards and accessories:

Control switchboards shall generally be erected at 1.35m height or as specified and fixed with minimum 2 Nos. of screws of length not less than 50 x 8mm, Boards shall be in line and plum and shall be in level with wall surface so as to fix mounting plate flush with wall, Termination of wires shall be done in switch and other accessories only by carefully inserting all strands in terminals and proper tightening. Switches shall be provided on phase wire only. Bare wire shall not be used for looping incoming supply to switches. Phase wire shall be routed through switch only. For plug socket phase wire shall be connected in right side terminal when seen from front. Proper termination of earth wire in Earth terminal shall be ensured. All blank modules shall be plugged with blanking plates.

Testing:

Insulation resistance test:

All wiring shall be tested with 500V Meggar between phases, phase – neutral and to Earth. IR value shall not be less than 1M-ohm.

Earth continuity:

Earth continuity shall be ensured at all earth terminals of plug outlets and at earth terminals of metal enclosures.

Polarity test:

Polarity test shall be carried out for ensuring the correct polarity in the plug.

Mode of Measurement:

Measurement shall be carried out on the basis per number of points, **for the point length up to 6 metre between switch and outlet.** For the length exceeding 6 metre 10% of overall rate shall be added for every 1metre.

DISMANTLING POINT WIRING:(WG-PW/DM)

Electrical installation of point wiring along with circuit mains from DBs shall be dismantled with adequate care without damaging surface of wall, ceiling, and flooring. The holes shall be refinished to match with the surrounding surface. Site shall be made clean by removing debris. Dismantled material shall be retained by the agency.

Mode of Measurement:

Executed quantity will be counted on the basis of number of points. (i.e. per Point)

Table No. 1/1

Maximum Number Of Single Core 1.1 kV Cables That Can Be Drawn In Rigid Steel Conduits

Size of cable mm²		*Size of conduit mm*													
Nominal Cross sectional area	No. and dia. of wires	16		20		25		32		40		50		63	
		S	B	S	B	S	B	S	B	S	B	S	B	S	B
1.0	1 / 1.12 Cu	5	4	7	5	13	10	20	14						
1.5	1 / 1.4	4	3	7	5	12	10	20	14						
2.5	1 / 1.8 3 / 1.06 Cu	3	2	0	5	10	8	18	12						
4.0	1 / 2.24 7 / 0.85 Cu	3	2	4	3	7	8	12	10						
6	1 / 2.80 7 / 1.06 Cu	2		3	2	6	5	10	8						
10	11 / 3.55 Al 7 / 1.40 Cu			2 2		5 4	4 3	8 6	7 5						
16	7 / 1.70					2		4	3	7	6				
25	7 / 2.24							3	2	5	4	8	6	9	7
35	7 / 2.50							2		4	3	7	5	8	6

50	7 / 3.0 Al 19 / 1.80									2		5	4	6	5

Note 1: Cu- applicable to only copper cable; Al- applicable to only Aluminium cable

Note 2: The table shows maximum capacity of conduits for the simultaneous drawing of cables. The columns headed 'S' apply to straight runs of conduits which have distance not exceeding 4.25m between draw in boxes and which do not deflect from straight by an angle more than 15^0. The columns headed 'B' apply to bent runs of conduit, which deflect from the straight by an angle of more than 15^0.

Note 3: In case of inspection type draw in box has been provided and if the cable is first drawn through one straight conduit, then through the draw in box and then through the second straight conduit such system may be considered as that of straight conduit even if the conduit deflects through the straight by more than 15^0.

Table No. 1/2

Maximum Number of Single Core 1.1 kV Cables That Can Be Drawn In Rigid Non-Metallic Conduits

Size of cable mm²		*Size of conduit mm*					
Nominal Cross sectional area	No. and dia. of wires	16	20	25	32	40	50
1.0	1 / 1.12 Cu	5	7	13	20		
1.5	1 / 1.4	4	6	10	14		
2.5	1 / 1.8 3 / 1.06 Cu	3	5	10	14		
4.0	1 / 2.24 7 / 0.85 Cu	2	3	6	10	14	
6	1 / 2.80 7 / 1.06 Cu		2	5	9	11	
10	11 / 3.55 Al 7 / 1.40 Cu			4	7	9	
16	7 / 1.70			2	4	5	12
25	7 / 2.24				2	2	6
35	7 / 2.50					2	5
50	7 / 3.0 Al 19 / 1.80					2 2	5 3

Note 1: Cu- applicable to only copper cable; Al- applicable to only Aluminium cable

Table No. 1/3

Maximum Number of Single Core 1.1 kV Cables in Cable Trunking (Casing and Capping)

Size of cable mm²		*Size of Trunking mm*				
Nominal Cross sectional area	12/16 x 12 mm	20 x 12 mm	25 x12 mm	32 x 12 mm	40 x 20 mm	50 x 20 mm
1.0						
1.5	3	5	6	8	12	18
2.5	2	4	5	6	9	15
4.0	2	3	4	5	8	12
6		2	3	4	6	9
10		1	2	3	5	8
16			1	2	4	6
25				1	3	5
35					2	4
50					1	3

Note 1: Cu- applicable to only copper cable; Al- applicable to only Aluminium cable

Table No. 1/4

Colour Coding For Conduits in Wall Entry

Conduit for	Colour
Light / Power circuit	Black
Security wiring	Blue
Fire Alarm wiring	Red
Low voltage circuits	Brown
UPS circuits	Green

Table No 1/5

Colour Code for Wires

Type	Colour
Phase	Red, Yellow, Blue
Neutral	Black
Earth	Green

1.11Telephone wiring (TW)

1. **General**

All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which PSI mark is not available in market, it shall be approved either by ITD *I* DOT of Govt. of India.

Work shall be carried out as per the Method of Construction specified by BIS and as specified by DOT (Department of Telephone), Govt. of India. Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of Engineer in Charge.

2. **Scope:**

Specification No (WG-TW)

To provide wiring for telephone on surface of wall or ceiling concealed in slab, wall, under flooring, etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified.

To provide, install, test & commission the instruments / equipments and accessories used in telephone system, such as; Main Distribution Frames (MDF), Krone Modules, Over Voltage Magazine, PBX / EPABX, CO-axial cable, Rosette box, Jumper wire, etc.

3. **Material:**

PVC Telephone cable: PVC insulated Tinned copper solid conductor with minimum 0.5 mm dia. (Single & Multi pair) properly paired and colour coded, shall be terminated on KRONE module with suitable tool.

Jelly filled Armoured Telephone cable: PVC insulated, PVC sheathed with steel armouring, Tinned copper solid conductor with minimum 0.5 mm dia multi pair, with Jelly, properly paired and colour coded.

Saddles: Saddles fabricated from G I sheet of required gauge (16/18 gauge) either galvanized finish or painted with superior quality enamel black paint, with necessary

shearing for mechanical strength, semi circular shaped with extended piece having suitable holes for fixing on spacer.

Hardware: Sheet Metal (SM) screws of required sizes, plugs, wooden gutties, etc.

MDF: Manufactured by reputed manufacturer of specified capacity, facility for wall mounting, with door & lock, aluminium frame for fixing of KRONE, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour.

Junction box: Manufactured by reputed manufacturer of specified capacity, facility for + wall mounting, with door & lock, aluminium frame for fixing of Krone, duly enclosed in cabinet made from 18 SWG CRCA sheet with powder coating of required colour. The depth of the box should consider the height of KRONE module plus protection magazine.

Over Voltage protection Magazine: Manufactured by reputed manufacturer of 10 pair capacity, with 3 pole gas discharge tube should be properly fitted on KRONE module in MDF / Junction box.

Rosette box: PVC *I* Bakelite box with LED indicator, RJ 11 jack, facility for fixing on wall.

Jumper wire: Twin twisted PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia.

KRONE Module: Disconnection type KRONE module having capacity to connect 10 pairs with silver-plated terminal contacts.

RG-11 Co-axial low voltage grade cable: PVC insulated with Tinned copper solid conductor minimum 0.5 mm dia, with connector at both ends suitable for termination in RJ type socket.

PBX (Analogue type): Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:

- Direct Inward dialling (DID) with voice guidance facility.
- Caller line identification (CLI) on Analog as well as digital extension.
- Call Billing software (CB)
- Dynamic STD locking
- Conferencing facility for specified extensions.

EPABX (Digital type): Manufactured by reputed manufacturer and approved by Telephone Engineering Certificate (TEC) of specified extensions, having following features:

- Direct Inward dialling (DID) with voice guidance facility.
- Caller line identification (CLI) on Analog as well as digital extension.
- Call Billing software (CB)
- Dynamic STD locking
- Conferencing facility for specified extensions.
  . Provision of battery back-up and power failure line transfer.

Method of Construction:

Drawing of telephone wire through Steel conduit *I* PVC conduit *I* PVC Trunking: As specified in Chapter for Point Wiring.

Erection of Jelly filled armoured Telephone cable:

Erection shall be done as per the layout finalized, in perfect level and plum. Before fixing the cable shall be straightened as far as possible for good aesthetics look. Cable shall be fixed with saddles firmly clipped on cable. Saddles shall be fixed to wall with minimum 50x8 mm SM screws with plugs/wooden gutties (Distance between two saddles shall be minimum 600 mm). Wooden gutties shall be used wherever required (Especially for stone wall). The entries made in wall, floor slab, etc for laying the cable shall be made good by filling and finishing with plastering the same.

4.3 Erection of MDF Junction box / Rosette box / PBX / EPABX, etc: Specified equipment shall be fixed to wall with minimum 50x8 mm SM screws, with necessary plugs, wooden gutties, etc. or may be fixed on Table Top if required.

5. Mode of Measurement:

Work done for telephone in Steel / PVC conduit / PVC Trunking will be measured on running meter basis, (i.e. per running meter) for each single run. For the other accessories /equipments shall be done as per unit specified. (I.e. Job / each)

1.12 Computer Cabling (COC)

A) UTP *Networking Cable*

General:

All material shall conform to relevant standard as per ISO/IEC11801, CENELEC EN50173 & TIA/EIA 568-B2-1; CUL listed & ETL verified.

Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of Engineer in Charge.

Scope:

Specification No (WG-COC/NC)

To lay the cables for Computers on surface of wall or ceiling concealed in slab, wall, under flooring etc, through existing metallic conduits, rigid PVC conduits, PVC trunking, with all necessary hardware, material, etc. as specified. The cable shall be used only for connections between Information Outlet & Patch/ Multimax Panel. (Exception: For making MDIX patch cord)

Material:

UTP cable:

4 pairs, 100 ohms, unshielded twisted pair (UTP), each pair separated by a PE former (Star shaped) solid 23AWG tinned copper conductor rated for temperature of 75° C, PVC insulated grey colour with following types as in the table 1.12/1

Table 1.12/1

Sr. No.	Type	Class	Tested frequency
1	Cat 6	E	350MHz
2	Cat 6+	E	500MHz

1. The Category 6 cable and Category 6 channel components shall be manufactured by a single manufacturer. The manufacturer shall warrant the Category 6 channel cable, components, and applications for a period of 20 years.
2. The Delay Skew on the 100 meter channel shall not exceed 30 ns
3. The 20 year warranty shall be a transferable warranty and has component replacement policy in case of manufacturing defect
4. Category 6, 100mtr channel, **4-connection** model should guarantee 400% margin over standard NEXT specification across swept frequency
5. Category 6, 100mtr channel, **6-connection** model should guarantee +4dB margin over standard NEXT Specification across swept frequency (1~250MHZ)

6. The high performance Category 6 UTP cable 23AWG shall be of the traditional round design with Mylar bisector tape Non-Plenum rated.
7. The cable shall support Voice, Analog Baseband Video/Audio, Fax, Modem,Switched-56, T-1, ISDN,RS-232, RS422, RS-485, 10BASE – T Ethernet, Token Ring, 100Mbps TP-PMD, 100BASE-T Ethernet, 155 Mbps ATM, AES/EBU Digital Audio, 270 Mbps Digital Video, 622 Mbps 64-CAP ATM and emerging high-bandwidth applications, including 1 Gbps Ethernet, gigabit ATM, IEEE 1394B S100 and S400, as well as all 77 channels (550 MHz) of analog broadband video.
8. The cable jacket shall comply with Article 800 NEC for use as a non-plenum cable. The 4 pair UTP cable shall be UL® and c (UL®) Listed Type CM.
9. Performance shall be characterized to 550 MHz to support high-bandwidth video applications

Non Plenum CAT6 UTP Cable

1 Weight=25.3 lb (1000 ft)
2 Jacket Thickness=.022 in
3 Outside Diameter=0.232 in
4 Conductor Diameter=.022 in
5 Insulation Type=High density Polyethylene
6 Jacket Material=PVC
7 Maximum Pulling Tension=25 lbs
8 Nom. Velocity of Propagation=0.69
9 Max DC Resistance=9.83 Ohms/100m
10 Mutual Capacitance @ 1 kHz = 4.95 nF/100m
11 Operating Temperature= -20 to 60° C
12 The high performance Category 6 UTP cable shall be of the **traditional round design with Mylar bisector tape.**
13 The 4 pair UTP cable shall be UL Type CM (non-plenum)
14 Performance shall be characterized to 550 MHz to support high-bandwidth video applications

Method of Construction:

The cable shall be laid in provided separate casing n capping/ PVC conduit/ trunking 400mm away from electrical cables wherever required without sharp bends. The cable shall be spliced at both the ends for punching/ crimping at keystone jacks/ UTP connectors.

Mode of measurement: Executed quantity shall be measured on running metre basis.

B) UTP Patch cord

Scope:

Specification No (WG-COC/PC)

Structured cabling, to make connections from switch to patch panel or information outlet to computer

Material:

UTP Patch Cord:

Assembly (conforming to EIA/TIA 568B-2-1) of Cat 6 type 4 unshielded twisted pair 24-26AWG (0.51mm-0.40mm), each pair separated by a PE former (Star shaped) 100 ohms stranded wire PVC insulated cables with modular RJ-45 polycarbonate UL94V housing 15milliohms gold over nickel contacts (superior three piece connector) crimped on both ends with T568A & T568B wiring schemes with 8P8C connection. The cord shall be branded. The cords shall be used in structured cabling in accordance with following table 1.12/2.

Table 1.12/2

Sr. No.	Length	Use in
1	1m	from switch to patch panel
2	3m	from computer to information outlet

1. All patch cords shall exceed TIA/EIA and ISO/IEC Category 6/Classs E specifications.
2. All patch cords shall be backward compatible with Category 5 and Category 5E systems.
3. The patch cords shall incorporate an anti-snag feature that provides maximum protection from snagging during moves and re-arrangements.
4. Patch cords shall be UL listed, UL-C certified and AUSTEL approved.
5. Patch cords shall support network line speeds in excess of 1 gigabit per second.

Physical Specifications:

Contact Material:	Phosphor Bronze
Contact Plating:	Gold 50 micro-inch (1.27 microns) Nickel 100 micro –inch (2.54 microns)
Insertion Life:	750 minimum
Plug Material:	Polycarbonate UL-rated 94 V-O
Operating Temperature:	14°F to 140°F (-10°C to 60°C)

Method of construction:
The patch cord shall be erected for making connections from switch to patch panel or from computer to information outlet.

Mode of measurement: Executed quantity shall be counted on number basis

BACKBONE (Fibre Network)

C) PVC Armoured Optical Fibre Cable (OFC)

General:

All material shall conform to relevant standard as per IEEE, EIA/TIA 568-B.3

Scope:

Specification No (WG-COC/OFC)

Optical fibre cable is used for connecting remote places networks by means of fibre switch or fibre module without much loss of signal.

Material:
Optical Fibre Cable:
Dielectric & metallic sheath armoured multimode optical fibre cable for underground/ aerial applications, fibres separated into binder groups inside a Industry standard 3mm gel filled buffer tubes standard around a central strength member; water blocked with dry water blocking material, making access & handling individual tubes easier & craft-friendly cable core; operating temperature of 40 - 70^0 C, crush resistance of 44N/m, as per table 1.12/3.

Table 1.12/3

04/ 06/ 12/ 24 fibres				
Sr. No.	Grade	Core dia.	1Gbps Distance at wavelength	
			850nm	1300nm
1	FR	62.5 µm	3000m	550m
2	FR	50 µm	1100m	600m
3	FRLS	62.5 µm	3000m	550m
4	FRLS	50 µm	1100m	600m

1. The cable shall support Gigabit Ethernet and legacy applications including Ethernet, Fast Ethernet, Token Ring, ATM and FDDI.
2. The loose tube dielectric OSP cable shall be armored with a corrugated polymer
3. coated steel tape and constructed with industry standard 3mm buffer tubes, stranded around a central strength member.
4. The armor layer shall provide crush protection meeting the Telcordia requirements for Superior Armored cable.
5. The buffer tubes shall compatible with standard hardware, cable routing and fan-out kits.
6. The cable core shall be water blocked with dry water-blocking materials, making access and handling of individual tubes easier and craft-friendly.
7. The cables shall be designed for point-to point applications as well as mid-span access, and provide a high-level of protection for fiber installed in the outside plant environment.

Physical Specifications:

Fiber Count	Subunits	Outer Diameter in. (mm)	Weight lbs/kit kg/km	Minimum Bend Radius In. (cm)		Max. Tensile Load lbs. (Newtons)		Max. Vertical Rise Feet (Meter)
				Loaded	Unloaded	Short Term	Long Term	
4 - 48	5	0.46 (11.7)	63 (94)	9.2 (23.4)	4.6 (11.7)	607 (2700)	180 (800)	2856 (871)
72	6	0.50 (12.7)	72 (107)	10.0 (25.4)	5.0 (12.7)	607 (2700)	180 (800)	2509 765)
96	8	0.58 (14.7)	95 (141)	11.5 (29.4)	5.8 (14.7)	607 (2700)	180 (800)	1904 (580)
144	12	0.74 (18.9)	146 (217)	14.8 (37.8)	7.4 (18.9)	607 (2700)	180 (800)	1237 (377)
288	24	0.86 (21.9)	211 (315)	17.2 (43.8)	8.6 (21.9)	607 (2700)	180 (800)	852 (260)

Note* There are 12 fibres per tube

S. No	Features
1	Support 10 Gbps up to 300 meters
2	Meets and exceeds the next generation multimode fiber (OM3) specifications in standards
3	Gigabit Ethernet is supported up to over 1.0 kilometre for 1000BASE-SX.
4	Supports very high speed data transmission by controlling DMD
5	Differential Mode Delay Exceeds TIA-492AAAC-A (IEC-60793-2-10ed2) @ 850nm
6	> 2,000 MHz-km laser bandwidth at 850 nm
7	Core Diameter should be 50.0 ± 3.0 µm
8	Cladding Diameter should be 125.0 ± 1.0 µm

9	Max. Attenuation, Loose Tube Cable 3.0 dB/km
10	Coating/Cladding Concentricity Error should be =< 6 µm
11	Clad Non-Circularity ≤ 1%
12	Zero Dispersion Wavelength 1297-1316 nm
13	Water Immersion, 73.4°F (23°C) should be ≤ 0.20 dB

Environmental and Mechanical

	Specification	Test Method
Operating Temperature	-40°to +70°C	FOTP - 3
Installation Temperature	20°to +70°C	N/A
Storage Temperature	-40°to +70°C	N/A
Crush Resistance	44 N/mm	FOTP - 41
Impact Resistance	Exceeds	FOTP - 25
Flexing	Exceeds	FOTP - 104
Twist Bend	Exceeds	FOTP - 85

Cable Identification:

Buffer Tubes and Fibres are identified with standard color coding:

1 - Blue	5 - Slate	9 - Yellow
2 - Orange	6 - White	10 - Violet
3 - Green	7 - Red	11 - Rose
4 - Brown	8 - Black	12 - Aqua

Hardware:

Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, clips etc.

Method of Construction:

As per the method of construction of PVC armoured cable. But these cables shall be tagged as "OFC" every metre length & can be laid in trench side by side. For underground cable laying cable indicator mentioning "Optical Fibre Cable" is a must.

Mode of measurement: Executed quantity shall be measured on running mete basis.

D) Fibre Patch Cord (FPC)

General:

All material shall conform to relevant standard as per IEEE, EIA/TIA, CENELEC

Scope:

Specification No (WG-COC/FPC)

The cord is to be used to connect fibre optic equipment to fibre optic cross-connects, interconnects & information outlets. (e.g. Remote Ethernet switch with fibre optic module can be connected to another same type of switch or Fibre Optic Switch.)

Material:

FRLS duplex fibre patch cord/ pigtails 1mtr in length with LC/ SC/ ST termination consisting of 1.6mm/ 3.0mm dia. 62.5um fibre with minimum bandwidth of 200MHz- km at 850nm & 500MHz at 1300nm with following specifications, as per table 1.12/4.

Table 1.12/4

Sr. No.	Outside dia.	Cable retention strength	Minimum Bend Radius	Maximum Cordage Tensile Load
1	1.6mm: 1.6mm x 3.3mm	50 Newton	Loaded: 5.1cm Unloaded: 3.5cm	Short Term : 3111 Newton Long Term: 93 Newton
2	3.0mm: 3.0mm x 5.9mm	50 Newton	Loaded: 5.8cm Unloaded: 3.5cm	Short Term : 400 Newton Long Term: 120 Newton

1. The fiber-optic patch cord shall be configurable with standard LC, SC, and ST terminations, and shall be available in either 1.6 mm or 3.0 mm duplex zip cord.
2. The 1.6 mm cordage shall exceed the requirements for larger diameter cordage and allows at least twice as many fibers to be installed in a cabinet.
3. The duplex cordage shall be 1.6 mm by 3.5 mm and have two single fiber cords joined together with a web.
4. The connector shall have a pull-proof design that helps prevent accidental disconnects and helps to assure optimal performance of equipment.
5. Custom hybrid patch cords shall also be available, to simplify migration to industry-leading connectors.
6. All fibers shall be Differential Mode Delay (DMD) tested by using a high-resolution test bench that exceeds the FOTP-220 standards and shall be independently certified by UL®.
7. All patch cords shall be a distinctive aqua color for positive identification.

Physical Specifications:

Minimum Bandwidth	@ 850 nm: 4700 MHz-km (laser), 3500 MHz-km (OFL)
	@ 1300 nm: 500 MHz-km (laser), 500 MHz-km (OFL)
Attenuation:	3.0 dB/Km @ 850 nm, 1.0dB/Km @ 1300 nm
Cable Outside Diameter:	Duplex: 1.6 x 3.7 mm
Min. Bend Radius:	2.5 cm
Operating Temperature Range:	-20 to 70 °C
Average Connection Loss:	LC = 0.1 dB
Return Loss Minimum:	-20 dB
Tip Material:	Ceramic

Mating Durability for:	500 Reconnects
Insertion Loss Change:	<0.2 dB
Temperature Stability:	-40 to + 75 °C
Insertion Loss Change:	<0.3 dB

Method of Construction:
Supplying & plugging FRLS duplex fibre patch cord/ pigtails into the LC/ SC/ ST termination of LIU & fibre module/ fibre switch port complete.

Mode of Measurement: Executed quantity shall be counted on number basis

1.13 Networking Components (NWC)

Switches/ Routers

A) Web Smart Power Over Ethernet Switch (ENS)

General:

All material shall conform to relevant standard as per IEEE802.3af PoE

Scope:

Specification No:WG-NWC/ENS)

Preferred in Wireless LAN obviating the use of external power supply for Access Points

Material:
Ethernet Switch:
Ethernet Switch with PoE: 24 ports PoE (Power Over Ethernet) with IEEE 802.3af PoE protocol, each PoE to supply up to 15.4 Watts for connecting devices such as Access Point needing additional power, 10/100Base-Tx 24 Fast Ethernet ports, 1000 Base-T 4 ports, 2 combo ports for flexible copper/fibre Gigabit connections, VLAN web manageable switch with rack mountable clips, screws, console utility software, mechanisms to detect an attack against the central processing unit of the switch and to take corrective action on attacking interface.

1. Feature-rich solution with functionality enabling by Secure Always On access to mission critical applications
2. High performance switch architecture and stacking performance delivering 320Gbps
3. High-density 10/100 ports for edge connectivity
4. Two combo 10/100/1000/SFP uplinks ports per switch for high speed gigabit or low speed connections such as 100FX
5. Simplified converged network deployments through support for Power over Ethernet (PoE), advanced Quality of Service (Quos), and auto-configuration of ports with IP Handsets & Wireless Access Points

Technical Specifications:

- 10/100 Power over Ethernet ports: 24 per switch
- 10/100/1000/SFP Gigabit ports: 2 per switch
- SFP support: SX, LX, XD, ZX, CWDM, 100FX, & T1
- Resilient Stacking: up to 8 units / 192 ports per stack
- Stacking ports: 2 built-in stacking ports per switch
- Total stacking capacity: 320 Gbps

- Individual switch packet throughput: 6.6 Mpps
- Individual switch capacity: 48.8Gbps
- Concurrent VLANs: 256
- Jumbo Frame Support on Gigabit ports
- Maximum MAC addresses: 8,000

Standards Compliance:

- IEEE 802.3 10BASE-T Ethernet
- IEEE 802.3u 100BASE-TX Fast Ethernet
- IEEE (ANSI) 802.3 Auto-negotiation
- IEEE 802.3z Gigabit Ethernet
- IEEE 802.3x Flow Control
- IEEE 802.1Q VLANs
- IEEE 802.1p Priority Queues
- IEEE 802.1D Spanning Tree
- IEEE 802.1w Rapid Spanning Tree
- IEEE 802.1s Multiple Spanning Tree Groups
- IEEE 802.3ad Link Aggregation
- IEEE 802.1X Ethernet Authentication Protocol
- IEEE 802.3AB Link Layer Discovery Protocol
- RFC 783 Trivial File Transfer Protocol (TFTP)
- RFC 791/950 Internet Protocol (IP)
- RFC 792 Internet Control Message Protocol (ICMP)
- RFC 826 Address Resolution Protocol (ARP)
- RFC 854 Telnet Server and Client
- RFC 951 / 1542 BOOTP
- RFC 1112 Internet Group Management Protocol v1
- RFC 1215 SNMP Traps Definition
- RFC 1271 / 1757 / 2819 RMON
- RFC 1361 / 1769 Simple Network Time Protocol (SNTP)
- RFC 1493 Bridge MIB
- RFC 1573 / 2863 Interface MIB
- RFC 1643 / 2665 Ethernet MIB
- RFC 1905 / 3416 SNMP
- RFC 1906 / 3417 SNMP Transport Mappings
- RFC 1907 / 3418 SNMP MIB
- RFC 1945 HTTP v1.0
- RFC 2011 SNMP v2 MIB for IP
- RFC 2012 SNMP v2 MIB for TCP
- RFC 2013 SNMP v2 MIB for UDP
- RFC 2138 RADIUS
- RFC 2236 Internet Group Management Protocol v2
- RFC 2474 Differentiated Services Support
- RFC 2570 / 3410 SNMPv3
- RFC 2571 / 3411 SNMP Frameworks
- RFC 2572 / 3412 SNMP Message Processing
- RFC 2573 / 3413 SNMPv3 Applications
- RFC 2574 / 3414 SNMPv3 USM
- RFC 2575 / 3415 SNMPv3 VACM
- RFC 2576 / 3584 Co-existence of SNMP v1/v2/v3
- RFC 2660 HTTPS (Secure Web Server)
- RFC 2665 Ethernet MIB
- RFC 2863 Interfaces Group MIB
- RFC 2674 Q-Bridge MIB
- RFC 2737 Entity MIBv2
- RFC 2819 RMON MIB

Additional features:

- Customizable Auto-negotiation Advertisements (CANA)
- Distributed Link Aggregation Groups
- Virtual Link Aggregation Control Protocol (VLACP)
- Single IP address for stack management
- Resilient fail-safe stacking
- Automatic Unit Replacement (Configuration and Software)
- Automatic Detection Automatic Configuration (ADAC)
- 802.1X Single Host Single Authentication
- 802.1X Single Host Multiple Authentication
- 802.1X Multiple Host Multiple Authentication
- 802.1X Guest VLAN
- 802.1X Non-EAP (NEAP) access
- DSCP-based Recognition, Marking and Recolouring
- Ingress and Egress Port Mirroring
- Broadcast and Multicast Rate limiting per port
- ASCII Configuration File
- Web, NNCLI, JDM
- SSHv2 and SNMPv3 secure management support
- Secure Network Access (NSNA) support
- BPDU Filter
- Stack Monitor
- USB software and ASCII configure upload
- New unit quick to configure

Resiliency Features:

- Should support a technology which will allow multiple physical network links between two network switches and another device (which could be another switch or a network device such as a server) to be treated as a single logical link and load balance the traffic across all available links
- Generally, all the physical ports in the link aggregation group must reside on the same switch. It should also support protocols remove this limitation by allowing the physical ports to be split between two switches.
- Load balancing mechanism should not be round robin or dynamic which may not work with applications like Voice & Video, where session persistence is must.

Main Objective of above features is to achieve Active-Active Cluster Switching. And achieve sub second fail over in case of Link failure & Device Failure, which will result in 99.999% uptime.

Power over Ethernet specifications:

- 802.3af compliant with Power classification support
- Signal pair power delivery
- Maximum 15.4 watts per port
- Maximum DTE Power AC 320 watts
- Maximum DTE Power AC + RPS 740 watts

Electrical specifications:

- Power supply: AC 100-240V, 50-60Hz
- Input current at 110v: 7.1A
- Input current at 220v: 3.6A
- Max power consumption: 470W

Dimensions:

- Width: 438.2mm (17.25 in)
- Height: 1RU 43.7mm (1.72 in)
- Depth: 368.3mm (14.5 in)

Environmental specifications:

- Operating temperature: 0 to 50 degrees C
- Storage temperature: -25 to 55 degrees C
- Relative humidity: 10% - 90%vnon-condensing
- Peak noise level: 42.3 dB
- Thermal rating: 375 BTU/hr
- Calculated MTBF: 242,552 hrs

Safety Agency Approvals:

- IEC 60950 International CB Certification
- EN 60950 European Certification
- UL60950 US certification
- CSA22.2, #60950 Canadian Certification
- NOM Mexican Certification

Electromagnetic Emissions and Immunity:

- CISPR22, Class A/CISPR24 International
- EN55022, Class A/EN55024 European
- FCC, Past 15, Class A US Certification
- ICES-003, Class A Canadian Certification
- AN/NZS 3548 Australian/NZ Certification
- BSMI - Taiwan - CNS 13438, Class A
- MIC - Korea - MIC, No. 2001-116
- VCCI Class A Japanese Certification

Hardware: Chromium plated brass nuts & bolts with special type of U shaped square washers of required sizes.

Method of construction:
The Ethernet switch fitted with rack mountable clips shall be fixed in U Rack (Networking Cabinet) with 4 nos. of chromium plated brass nuts & bolts. The switch shall be configured for TCP/IP addresses for switch IP & Gateway.

Mode of measurement: Executed quantity shall be counted on number basis

B) 24 Port Gigabit Switch (GBS)

Scope:

Specification No (WG-NWC/GBS)

To be used in wired LAN connections.

Material:
Gigabit Ethernet Switch:
24 nos. of 10/100/1000 Base-T Gigabit ports, 2 or 4 combo SFP slots for flexible fibre backbone, VLAN, manageable, 19" standard rack mountable, auto detection of MDI/MDIX, Layer 2, Safeguard Engine to protect against traffic flooding caused by virus/worm outbreaks with rack mountable clips, screws, console utility software.

1. Feature-rich solution with functionality enabling by Secure Always On access to mission critical applications
2. High performance switch architecture and stacking performance delivering 320Gbps
3. High-density 10/100/1000 ports for edge connectivity
4. Shared SFP uplinks ports per switch for gigabit fibre connectivity

Technical Specifications:

- 10/100/1000 Ethernet ports: 24 per switch
- SFP Gigabit ports: 4 per switch
- SFP support: SX, LX, XD, ZX, CWDM, 100FX & T1
- Resilient Stacking: up to 8 units
- Stacking ports: 2 built-in ports per switch
- Total stacking capacity: 320 Gbps
- Individual switch packet throughput: 36 Mpps
- Individual switch capacity: 88 Gbps
- Concurrent VLANs: 256
- Jumbo Frame Support on Gigabit ports
- Maximum MAC addresses: 8,000

Standards compliance:

- IEEE 802.3 10BASE-T Ethernet
- IEEE 802.3u 100BASE-TX Fast Ethernet
- IEEE (ANSI) 802.3 Auto-negotiation
- IEEE 802.3z Gigabit Ethernet
- IEEE 802.3x Flow Control
- IEEE 802.1Q VLANs
- IEEE 802.1p Priority Queues
- IEEE 802.1D Spanning Tree
- IEEE 802.1w Rapid Spanning Tree
- IEEE 802.1s Multiple Spanning Tree Groups
- IEEE 802.3ad Link Aggregation
- IEEE 802.1X Ethernet Authentication Protocol
- IEEE 802.3AB Link Layer Discovery Protocol
- RFC 783 Trivial File Transfer Protocol (TFTP)
- RFC 791/950 Internet Protocol (IP)
- RFC 792 Internet Control Message Protocol (ICMP)
- RFC 826 Address Resolution Protocol (ARP)
- RFC 854 Telnet Server and Client
- RFC 951 / 1542 BOOTP
- RFC 1112 Internet Group Management Protocol v1
- RFC 1215 SNMP Traps Definition
- RFC 1271 / 1757 / 2819 RMON
- RFC 1361 / 1769 Simple Network Time Protocol (SNTP)
- RFC 1493 Bridge MIB
- RFC 1573 / 2863 Interface MIB
- RFC 1643 / 2665 Ethernet MIB
- RFC 1905 / 3416 SNMP
- RFC 1906 / 3417 SNMP Transport Mappings
- RFC 1907 / 3418 SNMP MIB
- RFC 1945 HTTP v1.0
- RFC 2011 SNMP v2 MIB for IP
- RFC 2012 SNMP v2 MIB for TCP
- RFC 2013 SNMP v2 MIB for UDP
- RFC 2138 RADIUS
- RFC 2236 Internet Group Management Protocol v2
- RFC 2474 Differentiated Services Support
- RFC 2570 / 3410 SNMPv3
- RFC 2571 / 3411 SNMP Frameworks
- RFC 2572 / 3412 SNMP Message Processing
- RFC 2573 / 3413 SNMPv3 Applications

- RFC 2574 / 3414 SNMPv3 USM
- RFC 2575 / 3415 SNMPv3 VACM
- RFC 2576 / 3584 Co-existence of SNMP v1/v2/v3
- RFC 2660 HTTPS (Secure Web Server)
- RFC 2665 Ethernet MIB
- RFC 2863 Interfaces Group MIB
- RFC 2674 Q-Bridge MIB
- RFC 2737 Entity MIBv2
- RFC 2819 RMON MIB

Additional features:

- Customizable Auto-negotiation Advertisements (CANA)
- Distributed Link Aggregation Groups
- Virtual Link Aggregation Control Protocol (VLACP)
- Nortel Multiple Spanning Tree groups
- Single IP address for stack management
- Resilient fail-safe stacking
- Automatic Unit Replacement (Configuration and Software)
- Automatic Detection Automatic Configuration (ADAC)
- 802.1X Single Host Single Authentication
- 802.1X Single Host Multiple Authentication
- 802.1X Multiple Host Multiple Authentication
- 802.1X Guest VLAN
- 802.1X Non-EAP (NEAP) access
- DSCP-based Recognition, Marking and Recolouring
- Ingress and Egress Port Mirroring
- Broadcast and Multicast Rate limiting per port
- ASCII Configuration File
- Web, NNCLI, JDM
- SSHv2 and SNMPv3 secure management support
- Nortel Secure Network Access (NSNA) support
- BPDU Filter
- Stack Monitor
- USB software and ASCII configure upload
- New unit quick to configure

Resiliency Features:

- Should support a technology which will allow multiple physical network links between two network switches and another device (which could be another switch or a network device such as a server) to be treated as a single logical link and load balance the traffic across all available links
- Generally all the physical ports in the link aggregation group must reside on the same switch. It should also support protocols remove this limitation by allowing the physical ports to be split between two switches.
- Load balancing mechanism should not be round robin or dynamic which may not work with applications like Voice & Video, where session persistence is must.
- Main Objective of above features is to achieve Active-Active Cluster Switching .And achieve sub second failover in case of Link failure & Device Failure which will result in 99.999% uptime

Electrical specifications:

- Power supply: AC 100-240V, 50-60Hz
- Input current at 110v: 1.3A
- Input current at 220v: 0.7A
- Max power consumption: 150W

Dimensions:

- Width: 438.2mm (17.25 in)
- Height: 1RU 43.7mm (1.72 in)
- Depth: 368.3mm (14.5 in)
-

Environmental specifications:

- Operating temperature: 0 to 50 degrees C
- Storage temperature: -25 to 55 degrees C
- Relative humidity10% - 90% non-condensing
- Peak noise level: 42.4 dB
- Thermal rating: 290 BTU/hr
- Calculated MTBF: 312,001 hrs

Safety Agency Approvals:

- IEC 60950 International CB Certification
- EN 60950 European Certification
- UL60950 US certification
- CSA22.2, #60950 Canadian Certification
- NOM Mexican Certification

Electromagnetic Emissions and Immunity:

- CISPR22, Class A/CISPR24 International
- EN55022, Class A/EN55024 European
- FCC, Past 15, Class A US Certification
- ICES-003, Class A Canadian Certification
- AN/NZS 3548 Australian/NZ Certification
- BSMI - Taiwan - CNS 13438, Class A
- MIC - Korea - MIC, No. 2001-116
- VCCI Class A Japanese Certification

Hardware:

Chromium plated brass nuts & bolts with special type of U shaped square washers of required sizes.

Method of construction:

The Ethernet switch fitted with rack mountable clips shall be fixed in U Rack (Networking Cabinet) with 4 nos. of chromium plated brass nuts & bolts. The switch shall be configured for TCP/IP addresses for switch IP & Gateway.

Mode of measurement: Executed quantity shall be counted on number basis.

C) Broadband ADSL Router (ADSL)

General:

All material shall conform to relevant standard as per ITU G.992.2 & RFC

Scope:

Specification No (WG-NWC/ADSL)

For broadband internet connections to individual computer or Wired LAN/ Wireless LAN.

Material:

Broadband ADSL Router:

ADSL2+ broadband router with PPP(Point-to-Point Protocol), DHCP support, TCP/IP, downstream up to 24Mbps, upstream up to 1Mbps, RJ-11 for ADSL line, RJ-11 for phone line with Patch cord 3 metre in length, 10/100 Base-T port, USB 1.1 & 9V adaptor with UTP(Ethernet) Patch Cord, USB 2.0 patch cord, USB driver software

- **Designed for the small to medium business** - Simpler than enterprise class routers but more robust than consumer grade routers
- **Secure** - Good security and heavy encryption, but easy to implement; simple yet statefull firewall with simple filters
- **Simplified architecture** - Has a smaller processor that does not require a noisy fan, making it small and attractive for in-office or desk top installation

Note: Provision of Network Interface Card (NIC) shall be made for computer withou built in NIC.

Input/Output Requirements:

- WAN 1- 10/100 Base-T Auto-sensing - RJ-45
- LAN -4 Port Ethernet 10/100 Base-T Auto-sensing switch – RJ- 45 (fifth port for internal connection)

VPN Services:

- Minimum 10 IPSec tunnels
- IKEv1 Main Mode
- IKEv1 Aggressive Mode
- Up to 3 IP pools for Client
- 16 Split networks configured
- 64 Subnets specified for Split (inverse) network
- Diffie-Hellman Group 1, 2
- IPSec Tunnel Mode
- ESP
- Support for Dynamically addressed peers – ABOT
- NAT Traversal
- IPSec Transport Mode
- Keep Alive – For branch office and client tunnels
- VPN Router Client termination

Cryptographic Services:

- DES
- 3DES
- Data authentication SHA-1
- Data authentication MD-5
- AES -128
- AES – 192, 256 – Branch Office

Authentication Services:

- Pre-shared secrets
- External RADIUS support
- 802.1x/EAP support

Firewall:

- Statefull Packet Inspection
- IP application Inspection (FTP, SMTP, HTTP, Telnet, SSL, DNS, etc.)
- Denial of Service (DoS) detection and prevention
- URL Filtering

- Content filtering

ALG's:
- CU-SeeME
- FTP
- SIP
- H.323
- IPSEC
- VDiLive
- RealAudio

IP Services: NAT:
- NAT, Many to One, Static, Many to Many, Many One-to-One
- Port Forwarding
- IPSec pass-through
- SIP and H.323 ALG's
- Cone NAT
- NAT support for tunnel Mode IPSec tunnels

IP Services: Routing:
- Clear text routing
- Static
- RIP v1
- RIP v2

IP Services: DHCP:
- Client
- Server
- Relay
- Static mapping – 8 IP address lease mapping

IP Services: DNS:
- DNS Proxy
- Dynamic DNS

IP Services: NTP:
- RFC-867, 868, 1305

Layer Two Protocols:
- PPPoE
- IP masquerade/ alias – Configurable MAC address

Performance and Scaling:
- 20 Mbps 3DES throughput w/ 1500 byte packets
- 10 IPSec tunnels

Management:
- TFTP/FTP firmware upload
- RS232 console port
- Built-in Diagnostic tool
- SNMP
- Web GUI
- CLI (Command Line Interpreter)
- Remote management (FTP, Telnet, Web)
- Backup and restore configuration via FTP and Web

WAN and LAN Ports:

- The WAN and LAN ports are 10/100-base T Ethernet ports, without PoE

Two-Port Router:

• The router is based on the Intel IXP-425 network processor, running at 266 MHz. It will have 64 Mbytes of FLASH, and 32 Mbytes of RAM.

5-Port Switch:

- The 5-port layer-2 switch uses the Infineon 6996i chip

Serial Port:

• The serial port provides a DCE connection that can be used for either WAN back-up or for installing software into a router that has a corrupted software load

Power Supply:

• The router will be powered by 19 volts DC. The power supply circuit block will convert this supply to the supply voltages needed by the rest of the circuitry. The Business Secure Router 222 uses a universal wall-mount power supply.

Method of construction:

The ADSL Router shall be connected directly to the incoming phone line without any parallel telephone, then to telephone to avoid breaks in Internet connection, 9V DC adaptor connected to provide power supply, UTP patch cord for connections between router Ethernet port to computer/ switch. The router shall be configured as per the requirements of Broadband Internet Service Provider. As far as possible use of USB port shall be avoided.

Mode of measurement: Executed quantity shall be counted on number basis

Wireless LAN

) Indoor LAN Dipole Antenna (DPA)

General:

All material shall conform to relevant standard as per IEEE.

Scope:

Specification No (WG-NWC/DPA)

To enhance the signal strength of Access Point & Wireless PCI adaptor/ Router up to 500 metres.

Material:

Indoor LAN Dipole Antenna:

2.4 GHz, 5dBi gain, 50 ohms Omni-Directional Indoor Antenna outer covering made from polyurethane, polycarbonate swivel mechanism with built-in connector (RP-SMA & Reverse SMA/ TNC) for 802.11b/g wireless network

Method of Construction:

Supplying & erecting 2.4 GHz, 5dBi Omni-Directional Antenna to be screwed to Access point/ wireless PCI adaptor complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

E) Omni Directional Antenna (ODA)

Scope:

Specification No (WG-NWC/ODA)

To enhance the signal strength of Access Point & Wireless PCI adaptor/ Router at difficult to reach or far places.

Material:

Omni Directional Antenna:

2.4 GHz, 4dBi gain, Collinear, 50 ohms Omni-Directional Indoor Antenna covering horizontal 360 deg. vertical 36 deg. with 1.5m ULA-316 fixed cable, connectors (RP-SMA & Reverse SMA/ TNC), sturdy magnetic base stand to place it on flat surfaces & can be mounted on wall for 802.11b/g wireless network

Method of Construction:

Supplying & erecting 2.4 GHz, 4dBi Omni-Directional Antenna on wall or on the desktop or suitable place which shall be at least 150mm away from electronic devices such as computers, TV, video equipment & audio/video tapes.

Mode of Measurement: Executed quantity shall be counted on number basis.

F) Aesthetic Omni Directional Antenna (AODA)

Scope:

Specification No (WG-NWC/AODA)

To enhance the signal strength of Access Point & Wireless PCI adaptor/ Router at difficult to reach or far places.

Material:

Aesthetic Omni Directional Antenna:

2.4 GHz, 20W (cw) power handling, 40 deg down tilt, 50 ohms Omni-Directional Aesthetic Indoor Ceiling Antenna with ULA-316 fixed cable, connectors (RP-SMA & Reverse SMA/ TNC) for 802.11b/g wireless network.

S No.	Type	Colour	Gain (dBi)	Coverage (deg)		Cable (mtr)	Use
				Horizonta	Vertical		
1	Globe	White	4	360	63	2.0	Places with false ceiling
2	Rod	Gray-White	5	360	32	3.0	Any other place

Hardware: Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.

Method of Construction

Supplying & erecting 2.4 GHz, Omni-Directional Indoor Aesthetic Ceiling Antenna on ceiling at suitable place fixed with required size of SM screws, plugs/ gitties etc. complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

1.13 Networking Accessories (NAS)

LAN Accessories

A) UTP connector (RJ-45) (UTPC)

General:

All material shall conform to relevant standard as per TIA/EIA 568-B2-1.

Scope:

Specification No (WG-NAS/UTPC)

To make MDIX (Cross) patch cord required for cascade connections of switches & routers.

Material:

UTP connector:

Assembly of Gold over nickel contacts with 1.5A current carrying capacity, 30V with 15milli ohms contact resistance, 8P8C connection easy to crimp with crimping tool in polycarbonate UL94V housing.

Method of construction:

The UTP cable shall be spliced, untwisted not more than 12mm, inserted into the connector with sequence as shown in the diagram ____ as per EIA/TIA 568 B.2-1 & crimped firmly with crimping tool.

Mode of Measurement: Executed quantity shall be counted on number basis.

B) Information Outlet (Ethernet) (IO)

General:

All material shall conform to relevant standard as per TIA/EIA 568-B2-1.

Scope:

Specification No:(WG-NAS/IO)

For connecting computers to wired LAN or external wireless Ethernet interface in Wireless LAN.

Material:

Information Outlet Flush/ Surface type:

Spring shuttered front access, high impact plastic body FR grade with high performance unshielded RJ-45 keystone jack (conforming to EIA/TIA 568-B.2-1 Cat 6), 15 milliohms contact resistance, gold over nickel spring contact, 1.5A current carrying capacity, with T568A/T568B wiring option, insulation displacement connector for cable crimping to accept 22-26AWG solid wire for connections up to Gigabit Ethernet.

1. All Category 6 outlets shall meet or exceed Category 6 transmission requirements for connecting hardware, as specified in TIA/EIA 568-B.2-1 Commercial Building Telecommunications Cabling Standard and ISO/IEC 11801:2002 Second Edition.
2. The Category 6 outlets shall be backward compatible with Category 5E, 5 and 3 cords and cables.
3. The Category 6 outlets shall be of a universal design supporting T568 A & B wiring.
4. The Category 6 outlets shall be capable of being in a modular patching situation or as a modular telecommunication outlet (TO) supporting current 10BASE-T, Token Ring, 100 Mbps TP-PMD, 155 Mbps ATM, 622 Mbps ATM using parallel transmission schemes and evolving high-speed, high-bandwidth applications, including Ethernet, 1000BASE-T and 1.2 Gbps ATM.
5. The Category 6 outlets shall be capable of being installed at either a 45° or a 90° angle in any M-series modular faceplate, frame, or surface-mounted box avoiding the need for special faceplates.
6. The Category 6 outlets shall have improved pair splitters and wider channel for enhanced conductor placement. The outlet shall also have a low-profile wire cap, which protects against contamination and secures the connection. Multicolored identification labels shall be available to assure accurate installation.

Hardware:
Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.

Method of construction:
The Information outlet shall be fixed on the wall with sheet metal (SM) screws, rawl plugs/wooden gitties and making due connections as per EIA/TIA 568 B.2-1 by splicing the UTP cable, untwisted up to 12mm & punching the 4 pairs in the keystone jack with the help of punching tool. Not a single wire shall be left without connections.

Mode of Measurement: Executed quantity shall be counted on number basis.

:) Keystone jack (RJ-45) (KJ)

Scope:

Specification No (WG-NAS/KJ)

Structured cabling, to provide connections to switch/ server from desktop computers/ Wireless devices in the patch panel.

Material:
Keystone jack:
High impact plastic body FR grade with high performance unshielded RJ-45 keystone jack (conforming to EIA/TIA 568-B.2-1 Cat 6) , 20milli ohms contact resistance, gold over nickel spring contact ,1.5A current carrying capacity, with T568A/T568B wiring option, insulation displacement connector for cable crimping to accept 22-26AWG solid wire for connections up to Gigabit Ethernet

Method of construction:
The keystone jack shall be fixed with the help of its self-locking arrangement in provided patch panel before making due connection as per EIA/TIA 568 B.2-1 by splicing UTP cable, untwisted up to 12mm & punching the 4 pairs in the keystone jack with the help of punching tool. Not a single wire shall be left without connections.

Mode of Measurement: Executed quantity shall be counted on number basis.

D) Patch Panel (PP)

Scope:

Specification No (WG-NAS/PP)

Structured cabling for the installation of keystone jacks.

Material:

Patch Panel:

Three piece structure including front panel, cable management plate with pre-fitted B-clip to help in routing cables & metal case of 1.6mm thick Mild Steel powder coated panel of size 442.6mm X 44.5mm with the provision for 1 to 24 high density keystone jacks

1. 24 and 48 port patch panels with 110 IDC connector terminations on rear
2. The patch shall have electrical performance guaranteed to meet or exceed TIA/EIA 568-B.2-1 Category 6 and ISO/IEC Category 6/Class E specifications.
3. The panel shall have vertical and horizontal cord organizers available as to improve patch cord management.
4. The panel shall be available in 24-port and 48-port configurations with universal A/B labeling and 110 connector terminations on rear of panel allowing for quick and easy installation of 22 to 24 AWG cable.
5. The patch panel shall have a black powder finish over high-strength steel.
6. The panel shall be equipped with a removable rear mounted cable management bar and front and rear labels.
7. The panel shall be UL listed, UL-C certified and ACA approved.
8. The panel shall support network line speeds in excess of 1 gigabit per second and be backward compatible with Category 5e, 5 and 3 cords and cables.
9. The Category 6 modular jack panels shall meet or exceed the Category 6/Class E standards requirements in ISO/IEC 11801, CENLEC EN 50173 and TIA/EIA and shall be UL Listed.
10. The panels shall be either wall or 19-inch rack mountable.
11. The panels shall meet the following specifications:

Performance Specifications:

	Category 6 Patch Panel	High Performance Solution	Premium Performance Solution
		Category 6 Channel (4 Connectors)	
	Typical Worst Pair Margin*	**Guaranteed Margin****	**Guaranteed Margin****
Insertion Loss	64.3%	5.0%	7.5%
NEXT	6.6 dB	6.0 dB	7.0 dB
PSNEXT	7.3 dB	7.5 dB	8.5 dB
ELFEXT	6.4 dB	6.0 dB	8.0 dB
PSELFEXT	6.1 dB	8.0 dB	10.0 dB
Return Loss	6.6 dB	4.0 dB	4.0 dB
Frequency Range	1-250 MHz	1-250 MHz	1-250 MHz

Operational Specifications:	
Operating Temperature Range:	14°F to 140°F (-10°C to 60°C)
Storage Temperature Range:	-40°F to 158°F (-40°C to 70°C)
Humidity:	95% (non-condensing)
Nominal Solid Conductor Diameter:	0.025 to 0.020 in (0.64 to 0.51 mm) (22 to 24 AWG)
Nominal Stranded Conductor Diameter:	0.025 to 0.020 in (0.64 to 0.51 mm (22 to 24 AWG)
Insulation Size:	0.042 in (1.08 mm) (22 to 24 AWG) Maximum DOD
Insulation Types:	All plastic insulates (including PVC, irradiated PVC, Polyethylene, Polypropylene, PTF Polyurethane, Nylon, and FEP)
Insertion Life:	750 minimum insertions of an FCC 8-Position Telecommunications Plug
Front Panel:	Black powder painted steel.
Plastic:	High-impact, flame retardant, UL-rated 94V-0 thermoplastic

Hardware:

Chromium plated brass nuts & bolts with special type of U shaped square washers of required sizes.

Method of construction
The Patch Panel shall be firmly secured in U Rack (Networking Cabinet) with 4 nos. of chromium plated brass nuts & bolts.

Mode of Measurement: Executed quantity shall be counted on number basis.

E) Lightguide Interconnect Unit (LIU)

General:

All material shall conform to relevant standard as per IEEE, EIA/TIA, CENELEC

Scope:

Specification No (WG-NAS/LIU)

To terminate the fibre backbone cables & the equipment cables.

Material:
Lightguide Interconnect Unit:
Wall mount type Lightguide Interconnect Unit with dimensions shown in the table, an interfacing unit for fibre cables coming in from field & those originating from the equipments. consisting of fibre spools to provide minimum bending radius & splice trays as splice cover for pigtail splicing, two compartment design with adaptor panel in the centre, compartmentalizing the box, complete aluminium housing, fully powder coated, two doors enclosure with lock & key, rubber grommets at the cable entry points for tight sealing; Splice trays of 140 x125 x 10mm complete aluminium body fully powder coated with provision for fibre splices fully cushioned splice holder containing grooves for fixing splice protective sleeves; FR grade high impact resistance plastic two halves design stackable sufficient room for excess cable.

Sr. No.	Ports	Dimensions	Fibre splices
1	12	300 x 300 x 80mm	6
2	24	370 x 350 x 80mm	12

Hardware:
Sheet Metal (SM) screws of required sizes, plugs, wooden gitties, etc.

Method of Construction:
Supplying & erecting Lightguide Interconnect Unit (LIU) on wall with cable termination complete with sheet metal screws of required size, plugs/ wooden gitties.

Mode of Measurement: Executed quantity shall be counted on number basis.

Fibre Accessories

F) ST "D" type Multimode Adaptor (MMA)

General:

All material shall conform to relevant standard as per IEEE, EIA/TIA 568-B.3

Scope:

Specification No (WG-NAS/MMA)

To couple two connectors together i.e. to provide optical connectivity between fibre cable & fibre switch/ fibre module.

Material:
ST "D" type multimode adaptor consists of Die cast zinc alloy housing Nickel plated, thread type mounting, washer, nut, 2 nos. of rubber plugs, high precision mechanical design Zirconium/ Phosphor Bronze sleeve having insertion loss < 0.3dB max, return loss < -40dB.

Method of Construction:
Supplying & fixing ST " D" type with threads in provided Lightguide Interconnect Unit on adaptor panel with nut & washer. The adaptor which is not in use shall be plugged with rubber plugs on both the sides to avoid dust accumulation in the adaptor.

Mode of Measurement: Executed quantity shall be counted on number basis.

G) ST "D" type Multimode Connector for LIU (MMA-LIU1)

General

All material shall conform to relevant standard as per IEEE, EIA/TIA 568-B.3

Scope:

Specification No (WG-NAS/MMA-LIU1)

To terminate the optical fibre cables in Lightguide Interconnect Unit (LIU)

Material:

1. ***ST "D" type Multimode connector*** consists of bayonet coupling, 2.5mm Zirconium Ferrule, wide range of Ferrule selection, pre-radiused ferrule to provide fast physical contact polishing, insertion loss < 0.5dB.
2. Distilled water (as lubricant & flushing agent between each polishing process).
3. Epoxy or Anaerobic adhesive (to bond the fibre inside the ferrule).

Tools to be used:

- Carbide cleaving tool with 30 deg tip (to cut off the fibre to the desired height above the ferrule)
- Portable Microscope (200X minimum)
- Polishing kit (includes a polishing puck, pads & an assortment of diamond, aluminium oxide & silica films)

Method of Construction:
The fibre shall be stripped & cleaved. Epoxy and polish connectors field-installed to terminate backbone and distribution cables. Epoxy and polish fibre termination includes the following steps: injecting the connector ferrule with epoxy, curing, scribing the protruding fibre(s) from the ferrule, and polishing the ferrule end-face. The correct amount of epoxy must be injected into the ferrule and cured for the specified

time and temperature before the ferrule end-face is scribed and polished. Air bubbles shall be avoided in the epoxy to avoid micro-bending and increased loss. The cured epoxy securely bonds the fibre to the ferrule over the operating temperature minimizing relative fibre movement. The connectors with fibre cable shall be tested for loss test with Optical Time Domain Reflectometer (OTDR) & recording the results.

Mode of Measurement: Executed quantity shall be counted on number basis.

H) No Epoxy No polish ST "D" type Multimode Connector (MMA-LIU2)

Scope:

Specification No (WG-NAS/MMA-LIU2)

To terminate the optical fibre cables in Lightguide Interconnect Unit (LIU)

Material:
ST "D" type Multimode connector with Factory pre-polished fibre stub end face consists of bayonet coupling, 2.5mm Zirconium Ferrule, insertion loss < 0.5dB

Tools to be used:
Carbide cleaving tool with 30 deg tip (to cut off the fibre to the desired height above the ferrule)

Method of Construction:
The no Epoxy no polish connectors field-installed to terminate backbone and distribution cables. The fibre shall be striped, cleaved, inserted into the connector & mechanically secured. The connectors with fibre cable shall be tested for loss test with Optical Time Domain Reflectometer (OTDR) & recording the results.

Mode of Measurement: Executed quantity shall be counted on number basis.

I) Power over Ethernet Adaptor (PoEA)

General:

All material shall conform to relevant standard as per IEEE, TIA/EIA.

Scope:

Specification No (WG-NAS/PoEA)

To provide DC power supply to Ethernet devices, which do not have external/ built-in power supply.

Material:
Power over Ethernet Adaptor with output voltage of 5V DC or 12V DC (selectable) with input of 48V DC consists of Power over Ethernet base unit, Power over terminal unit, AC to DC power adaptor, DC power cable & Ethernet cable.

Method of Construction:
Supplying & connecting Power over Ethernet Adaptor with all its connections of base unit, terminal unit & AC to DC power adaptor for supplying power to Access Point, Router or Wireless Ethernet Transceiver complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

J) Tri-Mode Dual band Wireless PCI LAN Card (LANC1)

General:

All material shall conform to relevant standard as per IEEE 802.11 xs.

Scope:

Specification No (WG-NAS/LANC1)

Making provision of Wireless LAN connectivity for desktop PCs in difficult places where signal strength is low.

Material:
Wireless PCI 32 bit interface LAN card covering 100 metres (indoor) transmission speed of 108Mbps to connect 802.11b, 802.11g & 802.11a networks operating in two non-interfering bands 2.4 GHz & 5GHz with 4dBi to 5dBi gain Omni directional dipole antenna & driver.

Method of Construction:
Supplying & fixing Tri-mode dual band wireless PCI LAN card in desktop computer with installation of driver & configuration for TCP/IP address complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

K) Wireless PCI LAN Card (LANC2)

General:

All material shall conform to relevant standard as per IEEE 802.11g.

Scope:

Specification No (WG-NAS/LANC2)

Making provision of Wireless LAN connectivity for desktop PCs.

Material:
Wireless PCI 32 bit interface LAN card to connect 802.11g networks operating in 2.4 GHz band covering 100 metres range (indoor), transmission speed of 54Mbpswith external dipole antenna, detachable reverse SMA connector & driver.

Method of Construction:
Supplying & fixing Wireless PCI LAN card in desktop computer with installation of driver & configuration for TCP/IP address complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

L) Manageable Wireless LAN Access Point (LAP1)

General:

All material shall conform to relevant standard as per IEEE 802.11b/g & IEEE802.3/u

Scope:

Specification No (WG-NAS/LAP1)

To provide wireless access to the WLAN network.

Material:
Wireless Access Point consists of 108Mbps turbo mode handling heavy data payloads, 2dBi gain detachable dipole antenna with reverse SMA connector, external AC to DC 5V adaptor.

Method of Construction:
Supplying & connecting Wireless Access Point with AC to DC adaptor to Ethernet switch with due configuration for TCP/IP address complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

M) High Performance Manageable Wireless LAN Access Point with PoE (Power over Ethernet) (LAP2)
General:

All material shall conform to relevant standard as per IEEE 802.11b/g, IEEE 802.3/u & IEEE 802.3af

Scope:

Specification No (WG-NAS/LAP2)

To provide high performance wireless access to the WLAN network.

Material:
Wireless Access Point consists of 108Mbps turbo mode handling heavy data payloads, dual 5dBi gain detachable dipole antenna with reverse SMA connectors, Power over Ethernet 10/100 Base-Tx port.

Note: To connect the Access Point, availability of PoE Ethernet Switch or PoE adaptor is essential.

Method of Construction:
Supplying & connecting Wireless Access Point to PoE Ethernet switch or Ethernet Switch through PoE Adaptor with due configuration for TCP/IP address complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

N) Dual Band High Performance Manageable Wireless LAN Access Point with PoE (Power over Ethernet) (LAN3)

Scope:

Specification No (WG-NAS/LAP3)

To provide high performance wireless access to the WLAN network.

Material:

Wireless Access Point consists of 108Mbps turbo mode handling heavy data payloads operating in 2.4 GHz & 5 GHz bands, dual 5dBi gain detachable dipole antenna with reverse SMA connectors, Power over Ethernet 10/100 Base-Tx port.

Note: To connect the Access Point, availability of PoE Ethernet Switch or PoE adaptor is essential.

Method of Construction:
Supplying & connecting Wireless Access Point to PoE Ethernet switch or Ethernet Switch through PoE Adaptor with due configuration for TCP/IP address complete.

Mode of Measurement: Executed quantity shall be counted on number basis.

CHAPTER-2

FITTINGS

Chapter 2: Fittings (FG)

2.1 Lamps (FG-LP)

A) GLS/MF Lamps (GLS)

Specification No (FG-LP/GLS)

Scope:
Supplying and fixing of GLS/MF lamps suitable for 230 volts, and of specified wattage, conforming to IS: 418-1978. The lamp shall meet with the requirements mentioned in Table No. 2.1/1

Material:
Lamp: Made of blown molten glass, and shall comply with IS: 418-1978.
Filament: Made from Tungsten.
Cap: Made from high grade Aluminium sheet either Bi pin/Edison screwed.

Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Table No. 2.1/1

Lamp Data for GLS lamps

Watts (W)	Filling	Filament	Finish	Luminous flux (lm) at 230 V
25	Vacuum	Single Coil	Clear	220
40				425
60				700
100	Gas filled	Coiled coil		1380
150				2080
200				2920
300				4700
500				8300
1000				18600
1500				29500

B) Fluorescent tubes (FT)

Specification No (FG-LP/FT)

Scope:
Supplying and fixing of fluorescent tube suitable for 230 volts, and of specified wattage, conforming to IS: 2418 (Part 1 to 4) - 1977. The lamp shall meet with the requirements mentioned in Table No. 2.1/2

Material:
Lamp: Based on Tri-phosphor fluorescent powder, with triple coil electrode & anode ring.
Cap: Bipin cap made from high grade Aluminium sheet.
Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Table No. 2.1/2

Lamp Data for Fluorescent tubes

Lamp Type	Colour Rendering Index	Colour Temp. (°K)	Lamp watt (W)	Lamp volt (V)	Operating lamp current (A)	Nominal luminous flux (lm)	Life (hrs)
Tri-band phosphor 36 W	82 %	6500	36	103	0.44	3250	15000
	84 %	4000	36	103	0.44	3250	15000
	86 %	2700	36	103	0.44	3250	15000
24 W	85 %	3000	24	-	-	1350	-
	85 %	3400	24	-	-	1350	-
Normal 18 W	54 %	6500	18	58	0.37	1015	-

Normal 36 W	54 %	6500	36	103	0.44	2450	-

C) High Pressure Mercury Vapour Lamps (MV)

Specification No (FG-LP/MV)

Scope:
Supplying and fixing of High pressure Mercury vapour lamps suitable for 230 volts, and of specified wattage, conforming to IS: 9900 (Part 1 to 4) - 1981. The lamp shall meet with the requirements mentioned in Table No. 2.1/3

Material:
Lamp: Hard glass lamp made from high pressure mercury vapour with quartz discharge tube in an ovoid shaped, internally phosphor coated outer shell, with average colour temperature 3800 ^{0}K
Cap: 3 Pin BC/Screwed cap made from high grade Aluminium sheet.

Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Table No. 2.1/3

Lamp Data for High Pressure Mercury Vapour lamps

Lamp Type	Colour Temp. (^{0}K)	Lamp watt (W)	Lamp volt (V)	Operating lamp current (A)	Nominal luminous flux (lm)	Starting Time (min.)
HPL-N	3800	80	115	0.80	3500	3.5
HPL-N	3800	125	125	1.15	6250	3.5
HPL-N	3800	250	135	2.0	13500	4.0
HPL-N	3800	400	140	3.2	23000	4.0

D) ML Blended Lamp/Self Ballasted Lamp (MLL)

Specification No (FG-LP/MLL)

Scope:
Supplying and fixing of ML Blended lamps suitable for 230 volts, and of specified wattage, conforming to IS: 9900 (Part 1 to 4) - 1981. The lamp shall meet with the requirements mentioned in Table No. 2.1/4

Material:
Lamp: Hard glass lamp made from high pressure mercury vapour self ballasted with quartz discharge tube in an ovoid shaped, with average colour temperature 3600 ^{0}K

Cap: 3 Pin BC cap made from high grade Aluminium sheet.

Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Table No. 2.1/4

Lamp Data for High Pressure Mercury Vapour lamps

Lamp Type	Colour Temp. (°K)	Lamp watt (W)	Min. mains Voltage (V)	Lamp current (A)	Nominal luminous flux (lm)	Average life (hrs)
MLL	3600	160	190	0.72	2900	5000

E) High Pressure Sodium Vapour Lamps (SV)

Specification No (FG-LP/SV)

Scope:
Supplying and fixing of High pressure Sodium vapour lamps suitable for 230 volts, and of specified wattage, conforming to IS: 9974 (Part 1 & 2) - 1981. The lamp shall meet with the requirements mentioned in Table No. 2.1/5

Material:
Lamp: High pressure sodium vapour lamps with a polycrystalline translucent Aluminium discharge tube enclosed in an ovoid or tubular outer glass envelope. The ovoid shell shall have internally coated with uniform layer of diffusing powder applied electro statically. The discharge tube shall contain an amalgam of mercury and sodium along with Xenon gas as starting aid.
Cap: Screwed cap made from high grade Aluminium sheet.

Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Table No. 2.1/5

Lamp Data for High Pressure Sodium Vapour lamps

Lamp Type	Lamp watt (W)	Average Lamp volt (V)	Average lamp current (A)	Nominal luminous flux (lm)
SON	70	90	1.0	5800
SON	150	100	1.8	13500
SON-T	150	100	1.8	14000
SON	250	100	3.0	25000
SON-T	250	100	3.0	27000
SON	400	105	4.4	47000
SON-T	400	105	4.4	47500

F) Metal Halide Lamps (MHL)

Specification No (FG-LP/MHL)

Scope:

Supplying and fixing of Metal Halide lamps single/Double ended, suitable for 230 volts, and of specified wattage. The lamp shall meet with the requirements mentioned in Table No. 2.1/6

Material:
Lamp: High pressure metal halide gas discharged lamps with iodide additives indium, thallium and sodium in the mercury discharge. The discharge tube shall be enclosed in an ovoid, hard glass outer bulb with fluorescent coating (HPI-BU) or clear tubular outer hard glass envelope, (HPI-T).

- Colour Temperature : HPI-BU - -> 4300 ^{0}K
  : HPI-T - -> 4300 ^{0}K to 4900 ^{0}K

Cap: Pin type/Screwed cap made from high grade Aluminium sheet.

Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Table No. 2.1/6
Lamp Data for Metal Halide lamps

Lamp Type	Lamp watt (W)	Minimum Voltage for Ignition (V)	Average lamp voltage after 100 burning hours (V)	Average lamp current after 100 burning hours (A)	Lamp starting current (A)	CRI (Ra)	Average luminous flux after 100 burning hours (lm)
HPI-BU	250	200	128	2.2	3.2	69	17000
HPI-BU	400	200	125	3.4	6.0	69	30600
HPI-T	70	200	90	1.0	1.4	80	5500
HPI-T	150	200	98	1.8	2.4	85	12100
HPI-T	250	200	128	2.2	3.9	65	17000
HPI-T	400	200	125	3.4	6.0	65	30500

G) Compact Fluorescent Lamps (CFL)

Specification No (FG-LP/CFL)

Scope:
Supplying and fixing of Compact Fluorescent lamps either with adapter (Retrofit – Instant Start type) or without (Pin type-PL tube to be used with ballast), suitable for 230 volts, and of specified wattage. The lamp shall have life of 10000 burning hours and shall meet with the requirements mentioned in Table No. 2.1/7. All lamps shall have pf above 0.9.

Material:
Lamp: Based on fluorescent powder, with electrode.
Cap: Pin type/Screwed cap made from high grade Aluminium sheet.

Method of Construction:
The lamp shall be fixed at specified location as directed by site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Table No. 2.1/7

Lamp Data for Compact Fluorescent lamps

Mounting type	Lamp watt (W)	Colour Temp. (°K)	Luminous flux (lm)	Efficacy (lm/W)	Average life in (hrs)
Retrofit	13	5000	575	44	10000
Retrofit	13	6000	575	44	10000
Retrofit	13	2700	550	42	10000
Retrofit	18	5000	850	47	10000
Retrofit	18	6000	850	47	10000
Retrofit	18	2700	800	45	10000
Retrofit	25	5000	1100	44	10000
Retrofit	25	6000	1100	44	10000
Retrofit	25	2700	1050	42	10000
PL	9	2700	400	44	10000
PL	11	2700	600	55	10000
PL	15	2700	900	60	10000
PL	15	5000	800	53	10000
PL	20	2700	1200	60	10000
PL	20	5000	1100	55	10000
PL	23	2700	1500	65	10000
PL	23	5000	1350	59	10000
PL	5	2700	250	50	8000
PL	5	4000	250	50	8000
PL	7	2700	400	57	8000
PL	7	4000	400	57	8000
PL	11	4000	900	91	8000

2.2 Indoor fittings (FG/IDF)

A) Bulkhead Fitting

Scope:

Specification No: (FG-IDF/BHF)

Supplying and erecting bulkhead fitting with fine finished cast Aluminium enamel painted body with 20 mm conduit entry and clear glass / prismatic glass with guard and complete water tight hinged with locking screw porcelain holder to house CFL up to 5/9/11 Watt erected in position on polished double wooden block.

Material:

Bulkhead fitting:

Bulk Head Fitting shall be made from pressure dia-cast aluminium LM6 body in stove enamel finish and fitted with a heat resistant elegant glass cover through a gasket. A two pin BC porcelain holder for GLS or a CFL holder shall be fitted inside the housing. An electro-galvanized MS wire guard for protection against pilferage. Glass and wire guard assembly shall be hinged to the body for ease of maintenance. The bulkhead shall be suitable for Integral type CFL, with cable entry through one no.3/4" B.S. threaded inlet. Incoming wires shall be terminated on the lamp holder terminals in case of GLS

and in the terminal block in case of CFL. Two lugs with slots for facilitating wall/ceiling mounting. The fitting shall be I.P. 54 protected.
Wooden board: As per **(WG-PW/PW)** 1.6 specified in chapter for Point wiring.
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.

Method of Construction:

The Bulkhead shall be mounted on polish double wooden block with required size of SM screws, duly wired.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e.each)

B) Mirror Light Fitting Suitable for CFL 9/13/18 watts (ML1)

Scope:

Specification No (FG-IDF/ML1)

Supplying and erecting luminaries suitable for 9/13/18 watt CFL lamp made of engineering Plastic in approved colour finish and an elegantly designed milky white acrylic front diffuser, and bright anodized Aluminium reflector, with VPIT ballast, lamp holder, and connector.

Material:

Fitting:
The Luminaries Comprises housing made of engineering plastic in approved colour finish and an elegantly designed mike white acrylic front diffuser enclosing a bright anodized Aluminium reflector. Pre-wired with vacuum pressure impregnated copper ballast, lamp holder and mains connector with two holes on rear side facilitates wall/ceiling mountings, the grommet should be provided at rear side.
Wooden board: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Terminal connector: As per (FG-FG/AS10) specified in chapter 2.4.
Connection Wire: Two core flexible stranded copper wire cord 24/0.2mm ISI marked.

Method of Construction:

The fitting shall be mounted on polished Wooden / Laminated 4mm plywood top / block by required size of screws with necessary flexible wire for connection.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

C) Mirror Light Fitting Suitable for CFL 9 watts (ML2)

Scope:

Specification No (FG-IDF/ML2)

Supplying and erecting Mirror light fitting with 1 x 9 Watts CFL, with necessary Choke & accessories complete erected on polished wooden / sunmica block.

Material:

Fitting:
Channel fabricated from CRCA MS sheet and finished in reflector white inside and outside. Pre-wired with vacuum pressure impregnated copper ballast, lamp holder and mains connector, and an aesthetically appealing serrated / reeded opal diffuser held in position by decorative end covers white (W) / deep blue (B) / orange (O) / H.C. grey (G), post office red

(R)/ Black (BK) or approved colour, 12mm dia grommet. Two
6.5 mm dia holes on the rear side of the channel to facilitate wall / ceiling mounting.
Wooden board: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Connection wire: Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Terminal connector: As per (FG-FG/AS10) specified in chapter 2.4.

Method of Construction:

The fitting shall be mounted on polished Wooden / Laminated 4mm plywood top / block by required size of screws with necessary flexible wire for connection.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

D) Mirror Optic Recessed down Lighter suitable for 2 x 18 watts CFL (DL1)

Scope:

Specification No (FG-IDF/DL1)

Supplying and erecting circular type recessed down lighter suitable for 2x18 watts CFL, including gear box. The luminaire comprises a ceiling ring spun from Aluminium attached to mounting unit made of mild steel. The mounting unit has a pair of sliding brackets for fixing the luminaire to the ceiling.

Material:

Fitting:
Scientifically designed highly polished & anodized Aluminum reflector ensures precise light control with optimum light utilization, leading to substantial savings in energy cost and excellent ambient conditions. Reflector is fitted into the frame with decorative screw arrangement. Frame is fabricated from CRCA MS sheet and epoxy powder coated white. Precoated frame ensure corrosion free life. Fitting shall have a prismatic acrylic diffuser resting on upper part of reflector to reduce glare. Retaining clips facilitate mounting in false ceilings.
Ballast: **As per** (FG-FG/AS1) **specified in chapter 2.4.**
Bi-pin lamp holder: Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.
Capacitor / Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4.
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:
The fitting shall be fixed firmly in the designated place (False ceiling / unspecified ceiling) with the help of swinging bracket, and making the connection.
In case where fittings are to be installed flush with /on false ceiling; layout shall be given to civil wing and work shall be done in co-ordination with civil wing e.g. making recesses in false ceiling.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

E) Mirror Optic CFL fitting (MOF)

Scope:

Specification No (FG-IDF/MOF)

Supplying & erecting recessed / surface down lighter with mirror optics suitable for specified wattage of CFL.

Material:

Fitting:
Housing fabricated from CRCA sheet, epoxy powder coated, white enamelled, with mirror assembly comprising of significantly designed high purity aluminium reflector for high optical performance back wing light and with improved vertical illumination.
Ballast: As per **(FG-FG/AS1)** specified in chapter 2.4.
Bi-pin lamp holder: Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Chain: Heavy duty lacquered MS chain with hooks.
Block: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
Terminal connector: **As per** (FG-FG/AS10) **specified in chapter 2.4.**

Method of Construction:
Mirror optic fitting suitable for specified wattage of CFL complete erected on wooden block/PVC block /on ceiling directly in case of surface mounting fitting, as directed by site engineer, with necessary screws of suitable size, with rawl plugs, gutties, etc. In case of recesses mounting, the fitting shall be secured and erected by fixing the hook at ceiling, and the chain shall be fixed to the fitting, in such a manner that the fitting shall be in level with the designated place (false / unspecified ceiling)

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

F) Box type Fluorescent fitting (BFF)

Scope:

Specification No (FG-IDF/BFF)

Supplying & erecting white stove enamelled / powder coated box type fluorescent fitting suitable for T 8 tube/ tubes, with specified ballast, and necessary accessories, duly wired up for use on 250 V AC, supply and erected if required on varnished wooden / PVC block with flexible wire, twin core 24/0.20 mm. and with necessary materials complete and marking Sr. No. and date of erection.

Material:

Fitting:
White stove enamelled / powder coated box type fluorescent fitting suitable for T 8 tube, made of CRCA sheet not less than 0.5 mm thick, painted white on the reflector side and gray/any other colour (specified by the Engineer in-charge) on other surface. Wire ways shall be smooth & free from sharp edges, burrs, flashes & like which might cause abrasion of the insulation of the wiring. Parts such as metal set screws shall not protrude into wire ways. Fitting shall be duly wired up internally with appropriate size of wire. (Refer drawing no.IDF-1 (Fig.1))
Ballast: As per **(FG-FG/AS2) / (FG-FG/AS3) / (FG-FG/AS4)** specified in chapter 2.4.
Tube holders: **As per** (FG-FG/AS8) **specified in chapter 2.4**
Starter: **As per** (FG-FG/AS11) **specified in chapter 2.4**
Condenser: **As per** (FG-FG/AS7) **specified in chapter 2.4**
Starter holder: **As per** (FG-FG/AS9) **specified in chapter 2.4**
Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Paint: Superior quality enamel paint of specified colour.
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Chain: Heavy duty lacquered MS chain with hooks.
Down Rod: **Steel conduit as per** (WG-MA/CON) **specified in chapter for Point wiring.**
Block: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**

Method of Construction:

The complete fitting with all the above accessories shall be fixed on wooden / PVC block with SM screws (minimum size shall be 25x8 mm). The wooden/PVC block shall be fixed on wall/ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gutties, etc. S. No and date of erection shall be painted/marked by enamel paint. The fitting shall be connected with PVC insulated copper wire leads, to the point and testing shall be carried out.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

G) Chalk Board type Fluorescent fitting (CBF)

Scope:

Specification No (FG-IDF/CBF)

Supplying & erecting white stove enamelled / powder coated Chalk board type fluorescent fitting with enamelled reflector of 0.8 mm thick, white on the reflector side and gray on other surface suitable for T 8 tube/ tubes, with specified ballast, and necessary accessories, duly wired up for use on 250 V AC, supply including material required for erection and erecting as per requirement complete and marking Sr. No. and date of erection.

Material:

Fitting:
White stove enamelled / powder coated Chalk board type fluorescent fitting suitable for T 8 tube, made of CRCA sheet not less than 0.5 mm thick, with enamelled reflector of 0.8 mm thick, painted white on the reflector side and gray on other surface. Wire ways shall be smooth & free from sharp edges, burrs, flashes & like which might cause abrasion of the insulation of the wiring. Parts such as metal set screws shall not protrude into wire ways. Fitting shall be duly wired up internally with appropriate size of wire. (Refer drawing no.IDF-1 (Fig.2))
Ballast: As per **(FG-FG/AS2) / (FG-FG/AS3) / (FG-FG/AS4)** specified in chapter 2.4.
Tube holders: As per **(FG-FG/AS8)** specified in chapter 2.4
Starter: As per **(FG-FG/AS11)** specified in chapter 2.4
Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4
Starter holder: As per **(FG-FG/AS9)** specified in chapter 2.4
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Paint: Superior quality enamel paint of specified colour.
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Block/ Board: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
Terminal connector: **As per** (FG-FG/AS10) **specified in chapter 2.4.**

Method of Construction:

The complete fitting with all the above accessories shall be fixed on wooden / PVC block with SM screws (minimum size shall be 25x8 mm). The wooden/PVC block shall be fixed on wall/ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gutties, etc. S. No and date of erection shall be marked/painted by enamel paint. The fitting shall be connected PVC copper wire leads, to the point and testing shall be carried out.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

H) Industrial type Fluorescent fitting (INF)

Scope:

Specification No (FG-IDF/INF)

Supplying & erecting white stove enamelled / powder coated Industrial type fluorescent fitting with enamelled reflector of 0.8 mm thick, white on the reflector side and gray on other surface suitable for T 8 tube/ tubes, with specified ballast, and necessary accessories, duly wired up for use on 250 V AC, supply including material required for erection and erecting as per requirement complete and marking Sr. No. and date of erection.

Material:

Fitting:
White stove enamelled / powder coated Industrial type fluorescent fitting suitable for T-8 tube, made of CRCA sheet not less than 0.5 mm thick, with enamelled reflector of 0.8 mm thick, painted white on the reflector side and gray on other surface. Wire ways shall be smooth & free from sharp edges, burrs, flashes & like which might cause abrasion of the insulation of the wiring. Parts such as metal set screws shall not protrude into wire ways. Fitting shall be duly wired up internally with appropriate size of wire. (Refer drawing no.IDF-1 (Fig.3))
Ballast: As per **(FG-FG/AS2) / (FG-FG/AS3) / (FG-FG/AS4)** specified in chapter 2.4.
Tube holders: As per **(FG-FG/AS8)** specified in chapter 2.4
Starter: As per **(FG-FG/AS11)** specified in chapter 2.4
Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4
Starter holder: As per **(FG-FG/AS9)** specified in chapter 2.4
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Paint: Superior quality enamel paint of specified colour for marking.
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Block: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
Terminal connector: **As per** (FG-FG/AS10) **specified in chapter 2.4.**

Method of Construction:

The complete fitting with all the above accessories duly wired up shall be fixed on block with SM screws (minimum size shall be 25x8 mm). The block shall be fixed on wall/ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gutties, etc. The fitting if, to be ceiling suspended, it shall be fixed to the provided 16 SWG 20 mm dia., HG conduit duly threaded in ball suspension plate. The provided ball suspension plate shall be fixed on block with SM screws (minimum size shall be 25x8 mm) and the block shall be fixed at ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gutties, etc. S. No and date of erection shall be marked/painted by enamel paint. The fitting shall be connected with PVC insulated copper wire leads, to the point and testing shall be carried out.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

) Recess /Surface mounting Mirror Optic Fluorescent Fitting (MOP)

Scope:

Specification No (FG-IDF/MOP)

Supplying & erecting white stove enamelled / powder coated Mirror Optic type fluorescent fitting with enamelled reflector of 0.8 mm thick, white on the reflector side and gray on other surface suitable for T 8 tube/ tubes, with specified ballast, and necessary accessories, duly wired up for use on 250 V AC, supply including material required for erection and erecting as per requirement complete and marking Sr. No. and date of erection.

Material:

Fitting:
White stove enamelled / powder coated recess /surface mounting mirror optic type fluorescent fitting suitable for T 8 tube, made of CRCA sheet not less than 0.5 mm thick, painted white on the reflector side and gray on other surface, and with Mirror assembly comprising of significantly designed high purity aluminium reflector for high optical performance. Wire ways shall be smooth & free from sharp edges, burrs, flashes & like which might cause abrasion of the insulation of the wiring. Parts such as metal set screws shall not protrude into wire ways. Fitting shall be duly wired up internally with appropriate size of wire. (Refer drawing no.IDF-2 (Fig.4 & Fig.5))
Ballast: As per **(FG-FG/AS2) / (FG-FG/AS3) / (FG-FG/AS4)** specified in chapter 2.4.
Tube holders: As per **(FG-FG/AS8)** specified in chapter 2.4
Starter: As per **(FG-FG/AS11)** specified in chapter 2.4
Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4
Starter holder: As per **(FG-FG/AS9)** specified in chapter 2.4
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Paint: Superior quality enamel paint of specified colour.
Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.
Chain: Heavy duty lacquered MS chain with hooks.
Down Rod: As per **(WG-MA/CON)** specified in chapter for Point wiring.
Block: As per 1.6 specified in chapter for Point wiring. **(WG-PW/PW)**
Terminal connector: **As per** (FG-FG/AS10) **specified in chapter 2.4.**

Method of Construction:

The complete fitting with all the above accessories shall be fixed on wooden / PVC block / on provided chain / down rod with ball suspension plate with SM screws (minimum size shall be 25x8 mm). The wooden/PVC block shall be fixed on wall/ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gutties, etc. The fitting if, to be ceiling suspended, it shall be fixed to the provided 16 SWG 20 mm dia., HG conduit duly threaded in ball suspension plate. The provided ball suspension plate shall be fixed in wooden /PVC block with SM screws (minimum size shall be 25x8 mm). The wooden/PVC block shall be fixed at ceiling with SM screws (minimum size shall be 75x8mm) with necessary plugs, gutties, etc. In case of recesses mounting, the fitting shall be secured and erected by fixing the hook at ceiling, and the chain shall be fixed to the fitting, in such a manner that the fitting shall be in level with the false / unspecified ceiling. Sr. No and date of erection shall be marked or painted by enamel paint. The fitting shall be connected PVC copper wire leads, to the point and testing shall be carried out.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

2.3 Outdoor fittings (FG/ODF)

A) Street Light fitting suitable for CFL (CSL)

Scope:

Specification No (FG-ODF/CSL)

Supplying & erecting Street Light suitable for specified wattage of CFL complete with serrated acrylic diffuser & gasket, with necessary control gear and erected on provided bracket.

Material:

Fitting:
The fitting canopy shall be made of deep drawn of CRCA Sheet, powder coated / epoxy powder coated CRCA sheet housing with epoxy white powder coated CRCA sheet steel gray tray covered with anodized Aluminium reflector wired with a provision for housing open construction ballast required for specified wattage of CFL with clear acrylic cover with rubber gasket fixed by 4 Nos. toggles of suitable OD entry for direct mounting pipe bracket. Fitting shall be with degree of protection IP 54 electrical Safety Class-I. Fitting shall be duly wired up internally with appropriate size of wire. (Refer drawing no.ODF-1 (Fig.1 & Fig.2)
Ballast: As per **(FG-FG/AS1)** specified in chapter 2.4.
Bi-pin lamp holder: Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.
Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.
Terminal connector: **As per** (FG-FG/AS10) **specified in chapter 2.4.**

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

B) Street Light fitting suitable for HPMV/HPSV/MH Lamps (GSL)

Scope:

Specification No (FG-ODF/GSL)

Supplying & erecting Street Light fitting suitable for specified wattage of HPSV/HPMV/MH lamps, with all accessories, erected with provided bracket on wall/street light pole or at any place as directed by Site engineer with necessary materials.

Material:
Fitting:
The fitting comprises deep drawn one-piece Aluminium body. Lamp compartment has stove enamel white finish from inside & gray finish from outside. nickel chrome plated reflector / Aluminium reflector is mounted inside the lamp compartment for high optical efficiency control gear compartment houses a detachable gear tray & is wired with provided copper wound ballast, power factor improvement capacitor, electronic ignitor & with mains connector. The cable entry is through mounting pipe & terminated on mains connector inside the control gear housing with felt gasket which ensures weather proofness & also prevents entry of insects inside the housing. The fittings lamp compartment shall have IP 43 protection & IP 23 protection for control gear compartment. The fitting shall be ISI marked to IS: 10322 part -5: 1987 with Amendment No.1&2 and comply with requirements of IS: 10322: part-5/Sec-1:1985 with Amendment No.1&2 IS: 13383: part 2: 1992 with Amendment No.1. Fitting shall be duly wired up internally with appropriate size of wire. (Refer drawing no.ODF-2 (Fig.3))
Ballast: **As per** (FG-FG/AS5) **specified in chapter 2.4**
Ignitor: **As per** (FG-FG/AS6) **specified in chapter 2.4**
Condenser: **As per** (FG-FG/AS7) **specified in chapter 2.4**
Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

C) Street Light fitting suitable for T 8 Fluorescent tubes (FSL1)

Scope:

Specification No (FG-ODF/FSL1)

Supplying & erecting Street Light suitable for specified wattage complete with serrated acrylic diffuser & gasket, with necessary control gear and erected on provided bracket.

Material:

Fitting:

ISI marked Fluorescent Street light fittings complete with electronic ballast, transparent cover made out of 3mm thick acrylic sheet, gear cum reflector tray, canopy and lamp holder duly wired for use on 240-volt AC single phase 50 Hz without fluorescent lamp. Canopy shall be made of Aluminium sheet 1.25 mm thick minimum. Gear cum reflector tray (GCRT) shall be made of either CRCA sheet of 0.8 mm thick or Aluminium sheet of 1.25 mm thick.

Fitting shall be suitable for mounting up to a height of 15 meters and shall be able to withstand wind load test. It shall conform to class-1 of IS: 10322 (part 5/sec 3)/87 with amendment 1 and IP-53 protection with photometric test requirement with luminous efficiency not less than 65%.

i) Various components of fittings shall conform to IS specification as noted below.

a) Electronic ballast (EB) to IS: 13021: Part-1:1991 with Amendment No.1, IS: 13021: Part-2:1991 with Amendment Nos.1 and 2 and additional requirement as per the

b) Bi-pin lamp holders to IS: 3323/80 with amendment No.1/

c) PVC cables to IS: 694/90 with amdt.No.1 & 2.

ii) Surface of CRCA Steel and Aluminium sheets used shall be properly phosphatized and stove enamelled white on the reflector side, tray side and other surface stove enamelled grey.

iii) The street light fittings shall be required with socket bore of 30mm or 40 mm or 50mm for side entry/top entry type fittings. The socket bore, however, will be specified by the indenters at the time of placement of supply order.

iv) All wire leads to be adequately covered with sleeves for protection against accidental contracts.

v) All hardware parts used should be zinc coated or nickel/chromium plated so as to be corrosion resistant.

vi) Fitting shall be wired with multi-stranded copper wire terminating on suitable connectors. The wiring shall be properly clamped.

Ballast: As per **(FG-FG/AS1)** specified in chapter 2.4.

Bi-pin lamp holder: Conforming to IS: 3323/80 with amendment No.1 to the extent possible /applicable.

Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.

Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

D) Energy efficient T-5 2X14 & 2X24 Street Light fitting (FSL2)

Scope:

Specification No (FG-ODF/FSL2)

Supplying & erecting Energy Efficient T-5 2X14 & 2X24 Street Light fitting suitable for specified wattage of T-5 lamp complete with serrated acrylic diffuser & gasket, with necessary control gear and erected on provided bracket.

Material:

Fitting:

ISI marked Energy Efficient T-5 2X14 & 2X24 Street Light fitting complete with electronic ballast, transparent cover made out of 3mm thick acrylic sheet, gear cum reflector tray, canopy and lamp holder duly wired for use on 240-volt AC single phase 50 Hz without T-5 lamp. Canopy shall be made of Aluminium sheet of width 3" minimum per lamp. Gear cum reflector tray (GCRT) shall be made of either CRCA sheet of 0.8 mm thick or Aluminium sheet of 1.25 mm thick. Fitting shall be suitable for mounting up to a height of 15 meters and shall be able to withstand wind load test. It shall conform to class-1 of IS: 10322 (part 5/sec 3)/87 with amendment 1 and IP-65 protection

i) Various components of fittings shall conform to IS specification as noted below.

a) Electronic ballast (EB) to IS: 13021: Part-1:1991 with Amendment No.1, IS: 13021: Part-2:1991 with Amendment Nos.1 and 2 and additional requirement as per the

b) Bi-pin lamp holders to IS: 3323/80 with amendment No.1/

c) PVC cables to IS: 694/90 with amdt.No.1 & 2.

ii) Surface of CRCA Steel and Aluminium sheets used shall be properly phosphatized and stove enamelled white on the reflector side, tray side and other surface stove enamelled grey.

iii) The street light fittings shall be required with socket bore of 30mm or 40 mm or 50mm for side entry/top entry type fittings. The socket bore, however, will be specified by the indenters at the time of placement of supply order.

iv) All wire leads to be adequately covered with sleeves for protection against accidental contracts.

v) All hardware parts used should be zinc coated or nickel/chromium plated so as to be corrosion resistant.

vi) Fitting shall be wired with multi-stranded copper wire terminating on suitable connectors. The wiring shall be properly clamped.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

E) Flood Light fitting suitable for HPMV/HPSV/MH Lamps (GFL)

Scope:

Specification No (FG-ODF/GFL)

Supplying & erecting Flood Light fitting suitable for specified wattage of HPSV/HPMV/MH lamps, with all accessories, erected with provided bracket on wall/street light pole or at any place as directed by Site engineer with necessary materials.

Material:

Fitting:

Luminaries comprising of a die cast aluminium housing with store enamel finish. A flat toughened heat resistance glass is firmly fixed with a synthetic rubber gasket to the housing

by stainless steel toggles. Control gear comprises of provided copper wound ballast, power factor improvement capacitor, and electronic ignitor & with mains connector. Luminaire shall be mounted on a MS cradle for rotating in horizontal & vertical planes for facilitating positioning of the luminaire to effectively illuminate the target area. Brightened & anodized aluminium reflector for high optical efficiency. Cable entry shall be through suitable cable glands/ nipple provided for cable entry.
(Refer drawing no.ODF-2 (Fig.4))
Ballast: As per **(FG-FG/AS5)** specified in chapter 2.4
Ignitor: As per **(FG-FG/AS6)** specified in chapter 2.4
Condenser: As per **(FG-FG/AS7)** specified in chapter 2.4
Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

F) Gate Light fitting (PTL) suitable for HPMV/HPSV/MH Lamps (PTL)

Scope:

Specification No (FG-ODF/PTL)

Supplying and erecting Gate light fitting suitable for specified wattage of HPMV/SV/MH lamp/lamps, complete with control gear, duly wire and erected on provided pipe/pole or at any other place, as directed by site engineer.

Material:

Fitting:

The fitting comprising of a control gear capsule made of die cast aluminium alloy and shall have provision for fixing of control gear. Fitting shall have acrylic bowl with ushroom/round shape bowl of specified diameter, and shall be fixed on the top of the capsule. The bowl shall be adequately gasketed for weather proofness. The inner diameter of control gear capsule base shall be suitable for pipe of 50 mm to 77 mm O.D. Fitting shall have entry for termination of cable. The control gear capsule shall have IP 43 protection class. (Refer drawing no.ODF-2 (Fig.5))
Ballast: **As per** (FG-FG/AS5) **specified in chapter 2.4**
Ignitor: **As per** (FG-FG/AS6) **specified in chapter 2.4**
Condenser: **As per** (FG-FG/AS7) **specified in chapter 2.4**
Terminal connector: As per (FG-FG/AS10) specified in chapter 2.4.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided pole/pipe or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

G) Gate / Garden Light fitting suitable for CFL (GLT)

Scope:

Specification No (FG-ODF/GLT)

Supplying and erecting Gate / Garden light fitting suitable for specified wattage of CFL (One or Two), complete with control gear, duly wire and erected on provided pipe/pole or at any other place, as directed by site engineer.

Material:

Fitting:

The fitting comprising of a control gear capsule made of die cast aluminium alloy and shall have provision for fixing of control gear. Fitting shall have acrylic bowl with mushroom/round shape bowl of specified diameter, and shall be fixed on the top of the capsule. The bowl shall be adequately gasketed for weather proofness. The inner diameter of control gear capsule base shall be suitable for pipe of 50 mm to 77 mm O.D. Fitting shall have entry for termination of cable. The control gear capsule shall have IP 43 protection class.
Ballast: **As per** (FG-FG/AS5) **specified in chapter 2.4**
Ignitor: **As per** (FG-FG/AS6) **specified in chapter 2.4**
Condenser: **As per** (FG-FG/AS7) **specified in chapter 2.4**
Terminal connector: As per **(FG-FG/AS10)** specified in chapter 2.4.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided pole/pipe or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

2.4 Accessories for fittings (FG/AS)

Specifications for Ballasts / Ignitor / Condenser

Scope:

This chapter deals with supply, erection and connecting the accessories required in arious types of fittings suitable for fluorescent tubes, HPMV/SV/MH lamps, etc., and giving necessary testing of the fittings after erecting the accessory.

Specification No: (FG-FG/AS1)

1. **CFL Ballast:**
Ballast shall be copper wire wound, polyester filled or vacuum impregnated type suitable for Compact fluorescent lamp (CFL) conforming to I.S. 1534 with amendment No. 1 to 4 suitable for use on 230 V, 50 Hz, Single phase AC Supply, Temperature rise for ballast shall be 50 degree C, above the ambient temperature under normal conditions, minimum preheating current shall be 153 milliamp at 90 % of rated voltage and maximum 240 milliamp at 110 % of the rated voltage.

Specification No (FG-FG/AS2)

2. **Electromagnetic Ballast for T 8 fluorescent tubes:**
The ballast shall be of self Inductive coil of super enamelled copper low loss silicon steel lamination inductive coil with or without as additional resistor, designed to give operational characteristics for 40 W, at rated voltage of 220 V to 240V with calibration current 0.43 A., conforming to IS: 1534. Air temperature of the ballast winding shall not exceed 25^0 C above ambient, with appropriate IP protection class.

Specification No (FG-FG/AS3)

3. **Electronic Ballast for T 8 fluorescent tubes:**
The High frequency electronic ballast suitable for T 8 tube shall have circuit P.F of 0.95 / protected against mains disturbances, automatic cut off protection for a deactivated tube, glass fuse in main input circuitry, short circuit protection for a limited duration for both

PCB terminals and components. Should withstand 1.5 KV AC high voltage for insulation as per IS 1302/ Part I. Terminal block should be provided for mains and lamp connections, separate earthing terminal & tamper proof warrantee seal, the losses should not be more than 4 watts & without humming noise.

Specification No (FG-FG/AS4)

4. **VPIT Ballast T 8 fluorescent tubes:**
Vacuum impregnated low loss copper ballast made of low loss silicon steel lamination with super enamelled copper wire, vacuum impregnated with white resin, two-way terminal block and winding temperature limited to 120ºC, conforming to IS 1534 (Part -1 of 1977) and suitable for 240 Volt 50 Hz, AC supply.

Specification No (FG-FG/AS5)

5. **Ballast for HPMV/SV and Metal Halide Lamps:**
Ballast shall confirm to IS: 6616/82 with the following variations. The ballast shall be marked with watt loss and at rated voltage power delivered shall be between 92.5% and 107.5% of the power delivered by the reference ballast.
Ballast used in the fittings shall be energy efficient where watt loss will not exceed the following limits:-

Ballast for 70 Watts Lamp :		***15 Watts max.***
Ballast for 150 Watts Lamp	:	***19 Watts max.***
Ballast for 250 Watts Lamp	:	***26 Watts max.***
Ballast for 400 Watts Lamp	:	***38 Watts max.***

Winding Resistance shall be within a Tolerance of +5% & 10 % on values declared by the manufacturer.

Specification No (FG-FG/AS6)

6. **Ignitor:**
Ignitor shall be suitable for HPSV/MV and Metal Halide lamps. It shall not pulsate after the lamp has been fully ignited. Ignitor improper connection shall not cause any deleterious effects on the luminaries. The components shall be fitted inside the polypropylene, insulating container. Necessary wires with standard colour coding (Red, yellow & Black), shall be drawn outside the container for facilitating the connections.

Specification No (FG-FG/AS7)

7. **Condenser / Capacitor:**
Made of Metallized Polypropylene (MPP) housed in a polypropylene container, hermetically sealed designed for tropical conditions, of appropriate capacity conforming to IS: 1569 of 1976 used for P.F improvement not less than 0.9 for all types of luminaries or other appliances. Condenser shall be connected across the mains or in series with one ballast for lead / lag circuit.

Specification No (FG-FG/AS8)

8. **Tube holders:**
Lamp holder should be designed for tubular fluorescent T 8 lamps for all wattages, for end to end mounting, rotary locking type. The holder shall conform to IS: 3323 of 1980.

Specification No (FG-FG/AS9)

9. **Starter holder:**
Starter holder made from PVC with copper contacts, and groove for securely holding the starter. The starter holder shall conform to IS: 2215/1984.

Specification No (FG-FG/AS10)

10. **Terminal connector:**
Connector shall be made of Porcelain / Bakelite / PVC, with necessary brass / copper contacts, screws for connections. The nominal cross sectional area of the connector shall be suitable for leads of 2.5 mm^2.

Specification No (FG-FG/AS11)

11. **Starter:**
Starter made of bi-metallic glow switch housed in polypropylene can with plastic cover and brass pins, with radio interference suppression capacitors and heavy gauge nickel plated brass contact, conforming to IS 2215 of 1983. Starter shall be suitable for fixing in all types of starter holders.

Method of Construction:

The above accessories shall be fixed in the fitting, duly wired and necessary testing shall be carried out in presence of site engineer.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

2.5 Brackets for Outdoor fittings (BKT)

A) Bracket welded to Pole Cap (BKT/BPC)

Scope:

Specification No (FG-BKT/BPC)

Fabrication of Street light bracket of specified diameter 'B' class G.I. Pipe, of specified length welded to pole cap erected on top of the pole for erection of either single / double, side entry WP fluorescent/CFL/MV/MH/SV fitting(s), duly painted with one coat of red oxide & one coat of Aluminium paint, and erecting the same with provided leads.

Material:

GI Pipe: GI Pipe of specified diameter as per **(CW-PLB/GP)** mentioned in chapter 17.5
Pole Cap: Pole cap fabricated from 4 mm thick MS Sheet, of 30 cm in length.
Corner support: 3 mm thick MS flat / sheet
Set screws: MS bolts, nuts of 6 mm dia.
Paint: Red oxide & Aluminium paint.

Method of Construction:

The bracket shall be fabricated as per drawing No(s) BKT-1 (Fig.1 Fig.3), BKT-2 (Fig.4, Fig.5) and shall be placed on the pole cap. Inner diameter of pole cap shall be as per the outer diameter of pole with sufficient clearance, so as to facilitate easy placing of the cap on top of pole. Two holes of minimum 6 mm diameter shall be drilled to pole cap. The

nuts shall be placed on the pole cap duly aligned with the hole, and shall be butt welded. Bolts shall then be tightened through the nut so as to hold the bracket in vertical position.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

B)Wall Bracket (BKT/WB)

Scope:

Specification No (FG-BKT/WB)

Fabrication of Street light bracket of specified diameter 'B' class G.I. Pipe, 1.2 m in length erected on wall for erection of side entry WP fluorescent/CFL/MV/MH/SV fitting(s), duly painted with one coat of red oxide & one coat of Aluminium paint, and duly connected to supply with PVC wire leads.

Material:

GI Pipe: GI Pipe of specified diameter as per **(CW-PLB/GP)** mentioned in chapter 17.5
Hardware: Grouting MS bolts, nuts of 10 mm dia. & 100 mm length. 'U" shaped clamps of suitable diameter made of GI.
MS Flat: MS flat 3 mm thick 50 mm wide
Paint: Red oxide & Aluminium paint.
Wire leads: 1.5 mm², as per **(WG-MA/BW)** mentioned in chapter 1.3
Miscellaneous: Cement, Sand, Water, etc.

Method of Construction:

The bracket fabricated shall be erected on wall as explained below:

- MS flat of length 15 cm with 10 mm diameter hole shall be welded to the pipe as shown in drawing.
- Grouting bolts shall be grouted in wall and finished with cement plaster.
- Bracket shall be placed on the grouted bolts with clamps and nut shall be tightened.
- Fitting shall then be inserted onto the bracket and connections shall be made.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

C) Street Light Bracket (BKT/SLB)

Scope:

Specification No (FG-BKT/WB)

Fabrication of Street light bracket of specified diameter 'B' class G.I. Pipe, of required length erected on pole for erection of side entry WP fluorescent/CFL/MV/MH/SV fitting(s). duly painted with one coat of red oxide & one coat of Aluminium paint, and duly connected to supply with PVC wire leads.

Material:

GI Pipe: GI Pipe of specified diameter as per **(CW-PLB/GP)** mentioned in chapter 17.5
Hardware: MS nuts & bolts, Rubber Grommet.
MS Flat: MS sheet 5 mm thick 40 mm wide.
Paint: Red oxide & Aluminium paint.
Wire leads: 1.5 mm², as per **(WG-MA/BW)** mentioned in chapter 1.3

Method of Construction:

The bracket fabricated shall be erected on pole as explained below:

- Clamps of required length shall be fabricated as per outer diameter of pole and the pipe used for bracket.
- Bracket shall be clamped with the pole and the nuts bolts shall be tightened so as to keep bracket in plum.
- Hole for drawing the mains wire shall be drilled just below the bracket. The grommet shall be placed and the wires shall then be drawn.
- Fitting shall then be inserted onto the bracket and connections shall be made.

Mode of Measurement: Executed quantity shall be measured on running metre basis of the pipe used. (i.e. each)

2.6 Fans :(FG/FN)

A) *Ceiling Fans*

Scope:

Specification No (FG-FN/CF)

Supplying and erecting Ceiling fan of specified sweep with all accessories and necessary materials, erected in provided hook/clamp.

Material:

Ceiling Fan:

Electric Ceiling fan capacitor type with double ball bearing complete with capacitor, 300 mm down rod, canopies, shackles, reel insulator, half threaded bolts of 9.53 mm (3/8") dia 62.5 mm (2-1/2") to 88 mm (3-1/2") long and 7.94 mm (5/16") dia 44.5 mm (1-3/4") to 57 mm (2-1/4") long with nuts, with lock type split pin, spring & plate washers, etc.; three number blade made of Aluminium alloy, suitable for single phase, AC 210 volts, 50 Hz supply and conforming to class I of IS : 374/1979 with amendment no 1 to 6 except for performance parameters to the extent modified as details in general requirements. The down rod shall be capable to withstand a tensile load of 1000 kg without breakdown and a torsion load of 500 kg.cm without breakage as per Clause 10.14.1 of IS: 374/1979 with amendment no.1 to 6. Electrical motor should be single phase permanent capacitor type with no. of poles 12/14/16/18 (As per sweep), Class-I with basic insulation. Class of insulation shall be B class. The winding wire used for fan should be synthetic enamelled of 30 to 38 SWG.

Connection wire: Flat / round Two core flexible stranded copper wire cord 24/0.2mm ISI marked.

Paint: Superior quality enamel paint of specified colour for marking Sr. No and date of rection.

Table 2.6/1

Performance Parameters for Fans suitable for Rated Voltage

S.No.	Sweep	Maximum Input Power in watts	Air delivery in m^3/minute	Minimum Service Value
			at Rated Voltage	at 180 V
1	900 mm	42	140	3.4

2	1200 mm	50	215	4.3
3	1400 mm	60	270	4.5

Method of Construction:

Blades of ceiling fan shall be properly fixed. Down rod, clamp shall be carefully fixed with nut bolt and split pin. Canopies shall be tightened on down rod keeping sufficient clearance. Wiring connections shall be made with required wire leads. Regulator of fan shall be erected on provided switchboard with required wire leads.

Testing:

After erection fan shall be tested by connecting to supply at all positions of regulator. Also steadiness of fan shall be checked at full speed, so that there is no wobbling.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

B) Exhaust Fans

Scope:

Specification No (FG-FN/EXF)

Supplying and erecting Exhaust fan of specified sweep and speed, with all accessories and necessary materials, suitable to work on 230 V / 415 V, AC Supply 50 Hz, erected in position.

Material:

Exhaust Fan:

ISI marked Exhaust fan suitable for Single/Three phase AC 230/415 Volts 50 Hz, capacitor run with mounting ring, four numbers of fixing hole without regulator and louvers. The weep and speed shall be as per table below. Fan motor with moisture proof treatment and E class insulation, ISI marked, conforming to IS: 2312/67 with amendments 1 to 8. The fan mounting rings shall be proper pre-treatment followed with at least two coats of primer; final finish shall be with two coats of grey colour paint duly baked. The connecting leads shall be brought out for making connections.

Paint: Superior quality enamel paint of specified colour.

Table 2.6/2

Corresponding Speed with Sweep

S.No.	Sweep	Speed in RPM	Voltage level	CFM in m^3/hr
1	375 mm	900	230 V	2460
2	375 mm	1400	230 V	4000
3	450 mm	1400	230 V	6800
4	450 mm	900	230 V	4350
5	375 mm	900	415 V	2460

Method of Construction:
The Exhaust fan complete with all above accessories and duly wired shall be erected at specified position, connected to the supply and tested.

Testing:
After erection fan shall be tested by connecting to supply. Also steadiness and vibrations if any, of fan shall be checked at full speed, so that there is no wobbling.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

2.7 Accessories for Fans (FG-FAS)

Metal Sheet Cawl (MSC)

A) Metal Sheet Cawl

Scope:

Specification No (FG-FAS/MSC)

Supplying & erecting metal sheet cawl made from GI sheet of specified shape and with radius more than the size of exhaust fan. The cawl mounted on angle iron frame to be fixed to wall with grouting nut & bolts, duly painted.

Material:
GI Sheet: 20/22 SWG
Angle iron: 25x5x3 mm, 40x40x4 mm
MS Flat: 25 x 3 mm
Metal mesh: Expanded metal mesh
GI Wire: 8 SWG
Paint: Red Oxide, Superior quality enamel paint
Grouting bolts: 6 x 100 mm, 10 x 100 mm MS nut, bolts.
Finishing material: Cement, Sand, Putty, and Water.

Method of Construction:
Sector shaped Cawl:
Fabrication of Cawl shall be made from 22 SWG GI Sheet. The cawl shall be of round with sector shape, having radius more than the radius of exhaust fan. Cawl shall be fixed to the angle iron frame made from 40x40x4 mm angle, duly welded and the edges made smooth by removing burrs, etc. At the open end expanded metal mesh shall be fixed with 25x3 mm MS flat. Spray painting shall be done by applying 1 coat of red oxide and 2 coats of superior quality enamel paint of colour directed by site engineer. Cawl than shall be fixed on wall by grouting the foundation bolts. The damaged portion of wall shall be finished properly with cement mortar, with necessary colour washing. (Refer drawing no FG-FAS-3 (Fig. 5) for fabrication details.)

Rectangular/Round shaped Cawl:
Fabrication of Cawl shall be made from 20 SWG GI Sheet with slanting flaps at 45 degree. The cawl shall be of rectangular/round shape, having 10 cms radius more than the radius of exhaust fan. Cawl shall be fixed to the angle iron frame made from 25x25x3 mm angle, duly welded and the edges made smooth by removing burrs, etc. At the fan end expanded metal mesh shall be fixed. The flaps shall be rigidly fixed by GI wire of 8 SWG on the width wise. Spray painting shall be done by applying 1 coat of red oxide and 2 coats of superior quality enamel paint of colour directed by site engineer. Cawl than shall be fixed on wall by

grouting the foundation bolts. The damaged portion of wall shall be finished properly with cement mortar, with necessary colour washing. (Refer drawing no FG-FAS-3 (Fig. 6 & Fig.7) for fabrication details.)

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

DRAWINGS

Fan clamp for round pipe with hook (Refer drawing no. FG-FAS-1 (Fig.1)
Fan clamp for I-beam with hook (Refer drawing no. FG-FAS-1 (Fig.2)
Fan box with hook (Refer drawing no. FG-FAS-2 (Fig.3)

CHAPTER-3
APPLIANCES

3.1 Water-heaters AP-WH

Chapter 3 Appliances: (AP)

3.1 Water Heaters (AP-WH)

A)Storage / Pressure type Water Heaters (STWH)

Scope:

Specification No (AP-WH/STWH)

Supplying, erecting and testing of horizontal/ vertical, stove enameled, storage/pressure type water heater, suitable for wall / floor mounting, of specified capacity, one inlet with non return valve, one outlet with dead weight, pressure reducing valve, stop cock; suitable to work on 230/250-V single phase AC Supply, heating element of specified wattage, thermostat, control fusible plug, pilot lamp etc. ISI mark only and marking of S No. and date of erection. (IS 2082)

Material:

Outer Casing: Corrosion proof stove enameled/ powder coated, mild steel / engineering plastic body. Colour of the casing shall be as directed by Engineer in- charge.
Inner tank: It should be of electrolytic copper (99% pure) properly fabricated so as to be leak proof and of specified capacity.
Heating Element: Mineral filled / tubular / copper cord & nickel plated, and conforming to IS: 4159, of specified wattage.
Pilot Lamp: A neon gas field indicating lamp shows functioning of heating elements along with thermostat & thermal cut-out.
Thermal Insulation: Resin bonded glass wool slab insulation & should be filled between two casings of storage water heater.
Thermostat: A Stem type snap action thermostat, which should cut off the electric supply automatically as per setting of temperature & should be ISI mark.
Thermal Cut-out: In case of thermostat failure this cutout should cut off the electric supply automatically and should restart only on pressing the reset knob.
Pressure Release Valve: If pressure exceeds above 50 psi, it should release the pressure & should be fitted on the inlet pipe.
Dead weight: It will operate when pressure in inside tank increase beyond specified limit.
Fusible plug: Cast aluminium body with threading, and hole for plug with fusible metal. The metal shall be fused, only all the other safeties fails & at high pressure
Hardware: 100x10 mm grouting bolts, MS washers, nuts, etc.
Wall Fasteners: 100x10 mm with vertical cuts, and pin at the centre, washer and nut, etc., made of MS. (Similar to Anchor bolt fastener)
Grouting material: Cement, Sand, water, etc.
Paint: Superior quality enamel paint of specified colour.

Method of Construction:

The water heater shall be erected in required position with necessary hardware's and base is grouted, as per the site situation. The water heater is to be connected to water supply on inlet side by valve, mountings and connected to outlet tap.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

CHAPTER-4

ENERGY SAVING DEVICES

4.1 Solar Lighting ESD-SOL

Chapter 4 :Energy Saving Devices (ESD)

4.1 Solar Lighting (ESD-SOL)

A) Solar Street Light (SOL)

Scope:

Specification No (ESD-SOL/STL)

Supplying & erecting Solar Street Light Fittings suitable for specified wattage of CFL, along with GI/MS Pipe Pole. The system should be designed to automatically switch ON at dusk, operate throughout the night, and automatically switch OFF at the dawn, under average daily, solar radiation conditions of 5 kWh/m² on a horizontal surface. (Refer drawing no.ESD-SOL-1 (Fig.1))

Material:

1. PV Module(s):

- The PV module(s) shall contain crystalline silicon solar cells.
- The power output of the module(s) under STC should be a minimum of 74 W, either two modules of minimum 37W output each or one module of 74W output should be used.
- The operating voltage corresponding to the power output mentioned above should be 16.4 V.
- The open circuit voltage of the PV modules under STC should be at least 21.0 Volts.
- The terminal box on the module should have a provision of opening for replacing the cable, if required.

2. Inverter:

- The inverter should be of quasi sine wave or full sine wave type with frequency in the range of 20-35 KHz.
- The total electronic efficiency should be at least 80%.
- No blackening or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (two minutes ON followed by four minutes OFF is one cycle).
- The idle current consumption should not be more than 10 mA.
- Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery through out the year.
- Necessary length of wires, cables, and fuses should be provided.
- The PV module will be used to sense the ambient light level for switching ON and OFF the lamp.

3. Electronic Protections:

- Adequate protection is to be incorporated under no load conditions e.g. when the lamp is removed and the system is switched ON.
- The system should have protection against battery overcharge and deep discharge conditions.
- Fuses should be provided to protect against battery overcharge and deep discharge conditions.
- A blocking diode should be provided as a part of the electronics to prevent reverse flow of current throughout the PV module(s), in case such diode is not provided with the solar module(s).
- Full protection against open circuit accidental short circuit and reverse polarity should be provided.

4. Mechanical Hardware:

- A metallic frame structure (with corrosion resistance paint) to be fixed on the pole to hold the SPV module(s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45 degrees so that the module(s) can be oriented at the specified tilt angle.
- The pole should be made of mild steel pipe with a height of 4 meters above the ground level, after grouting and final installation. The pole should have the provision to hold the weather proof lamp housing. It should be painted with a corrosion resistant paint.

- A vented acid proof and corrosion resistant painted metallic box for outdoor use should be provided for housing the battery.

Method of Construction:

The entire solar light with all accessories shall be installed at designated place, duly wired and giving necessary testing.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

B)Solar Home Lighting System (SHL)

General:

A solar home system aims at providing solar electricity for operating lights and/or fan or energizing a DC operated portable TV set for specified hours of operation per day.

Scope:

Specification No (ESD-SOL/SHL)

Supplying & erecting Solar Home Light Fittings suitable for specified wattage of CFL/DC Fan, along with required accessories.

Material:

1. *Models:*
The model shall be as mentioned in the Table No. 4.3/1 given below:

Table No. 4.3/1

Model wise details of Solar Home Lights

S.No.	Model Configuration	Details of PV Module	No. of 9/11 Watts CFL	No. of DC Fan (Wattage < 20 Watts)	Battery
1	Model 1 (1 Light)	1x18 Wp under STC	1	0	1x12 V, 20 AH, Tubular/Plate, low maintenance
2	Model 2 (2 Lights)	1x37Wp under STC	2	0	1x12 V, 40 AH, Tubular/Plate, low maintenance
3	Model 3 (1 Light and 1 Fan)	1x37Wp under STC	1	1	1x12 V, 40 AH, Tubular/Plate, low maintenance

2. *Lamps:*

- The lamps shall be of compact fluorescent (CFL) type, either 4-Pin or 2 Pin types, with rating of 9/11W. For the 4-Pin type CFL a suitable preheating circuit must be provided.
- (b) The light output from the lamps should be around 600 +/- 5% lumens (9W CFL) and 900 +/- 5% lumens (11W CFL).
- (c)The lamps should be housed in an assembly suitable for indoor use, with a reflector on its back. While fixing the assembly, the lamp should be held in a base up configuration.

3. *Battery:*

- The battery will be of flooded electrolyte type, positive tubular plate, low, maintenance lead acid battery.
- (b) The battery will have a minimum rating of 12V, 20 or 40 or 75 Ah, the discharge rate of $1/10^{th}$ of the AH capacity of the battery.
- 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.

4. *Electronics:*

- The inverter should be of quasi sine or full sine wave type with frequency in the range of 20-35 KHz. Half wave operation is not acceptable.
- (b) The total electronic efficiency should be at least 80%.
- © No blackening or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (two minutes ON followed by four minutes OFF is one cycle.)
- (d) The idle current consumption should not be more than 10 mA.
- (e) Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery though out the year.
- Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

5. *PV Module(s):*

- The PV module(s) shall contain crystalline silicon solar cells.
- The power output of the module(s) under STC should be a minimum of 18W or 37W or 74W. In case of Model 4 & 5 either two modules of 37 W each or one module of 74W should be used.
- The operating voltage corresponding to the power output mentioned above should be 16.4 V
- The open circuit voltage of the PV modules under STC should be at least 21.0 Volts
- The terminal box on the module should have a provision for opening for replacing the cable, if required.
- A strip containing the following details should be laminated inside the module so as to be clearly visible from the front side:

6. *DC Fan:*

- The wattage of the fan should not be more than 20 Watts and it should operate at 12V DC.

7. *Electronic Protections:*

- Adequate protection is to be incorporated under no load conditions e.g. when the lamps are removed and the system is switched ON.
- The system should have protection against battery overcharge and deep discharge conditions.
- Fuses should be provided to protect against short circuit conditions.

8. *Mechanical Components:*

- Metallic frame structure (with corrosion resistance paint) to be fixed on the roof of the house to hold the SPV module(s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45, so that it can be installed at the specified tilt angle.
- A vented metallic box with acid proof and corrosion resistance paint, for housing the storage battery indoors should be provided. The box can be of injection Moulded plastic or wooden for home lighting models 1, 2 and 3 only.

Method of Construction:

The entire Solar Home light with all accessories shall be installed at designated place, duly wired and giving necessary testing.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

CHAPTER-5

SWITCHGEARS

5.1	LT --I/C M/C Switches, ATS, Bus Bar, Feeder Pillar	SW-SWR
5.2	I/C M/C Distribution boards	SW-DB
5.3	LT -- MCB	SW-MCB
5.4	LT -- MCBDB	SW-MCBDB
5.5	LT -- MCCB	SW-MCCB
5.6	LT -- RCCB	SW-RCCB
5.7	LT – Oil Circuit Breakers	SW-OCB
5.8	LT – Air Circuit Breakers	SW-ACB
5.9	HT – SFU, LBS	SW-HTS
5.10	HT – Breakers (VCB)	SW-VCB
5.10	Drawings	

Chapter 5 Switchgears (SW)

5.1 LT—I/C M/C Switches, ATS, Feeder Pillar (SWR)

General

All material shall confirm to relevant standard as per BIS and shall carry ISI mark.
Work shall be carried out as per the method of construction as specified by BIS/Chapter 1 6 of P.W. Dept. Handbook/NEC.
Refer IS; 13947/1993, For Switch gears, IS: 13703/1993 for HRC fuses.
Incoming contacts for all switchgears shall be shrouded for avoiding accidental contact.

A) Indicator DP (BDP)

Scope:

Specification No (SW-SWR/BDP)

Supplying surface/flush mounting Bakelite D.P switch and erecting on filled polypropylene ISI marked board or on screwed board with top of plywood pasted with laminate.

Material:

DP Switch: Bakelite double pole switch 32A 250V, with copper contacts for make & break, and fuse, indicator lamp with shrouded incoming contacts.
Boards: As per **(WG-PW/SW)** in chapter of Wiring para No. 1.6
Hardware: SM screws, rawl plug, wooden gutties etc.

Method of Construction:

The DP switch shall be erected on specified board or flush in provided enclosure.

Mode of Measurement:

Executed quantity will be counted on number basis. (i.e. Each)

B) IC/Metal clad DP (MDP)

Scope:

Specification No (SW-SWR/MDP)

Supplying and erecting IC/Metal clad DP switches of specified rating on angle iron frame of suitable size.

Material:

DP Switch: Single phase Double pole metal / iron clad weatherproof air break switch fuse unit, confirming to IS: 13947 (part- 1 &3)/ 1993 with facility to de-link neutral, suitable for single phase 240 volts, 50 Hz AC supply, having positive make break arrangement with shrouded incoming contacts, cable entry holes, sealing arrangement and mounting arrangements.
Fabrication: Required size of angle iron / MS Flat.
Paint: Superior quality enamel paint of specified shade & colour, Red Oxide paint.
Hardware: SM screws, MS Nuts & bolts, rawl plug, wooden gutties etc.
Grouting Material: Cement, Sand, Putty, water, etc.

Method of Construction:

The switch shall be erected at designated place duly mounted on suitable size of angle iron frame as per Table no. 5.1/1 with the help of required nut bolt washer etc. The angle frame to be erected on wall with the help of screws, or to be grouted in wall with the help of cement concrete etc. Frame shall be painted prior to erection.

Mode of Measurement:
Executed quantity will be counted on number basis. (i.e. Each)

C)IC/Metal clad TP/TPN switches (MTP)

Scope:

Specification No (SW-SWR/MTP)

Supplying and erecting IC/Metal clad TP/TPN /on load/off load changeover switches of specified rating on angle iron frame of suitable size.

Material:
TP/TPN Switches: Three phase Triple pole / Three phase Triple pole with neutral link weatherproof metal clad air break switch fuse unit of specified rating, confirming to IS: 13947 (part- 1 &3)/ 1993 with positive make and break arrangement with shrouded incoming contacts, facility suitable for Three phase 415 volts, 50 Hz AC supply, It shall be fitted with interlock-able cover and re-wire able type porcelain fuse and having cable entry holes, sealing arrangement and mounting arrangements.
Fabrication: Required size of angle iron / MS Flat.
Paint: Superior quality enamel paint of specified shade & colour, Red Oxide paint.
Hardware: SM screws, MS Nuts & bolts, rawl plug, wooden gutties etc.
Grouting Material: Cement, Sand, Putty, water, etc.

Method of Construction:
The switch shall be erected at designated place duly mounted on suitable size of angle iron frame as per Table No. 5.1/1 with the help of required nut bolt, washer, etc; on frame/wall. The angle frame to be erected on wall with the help of screws, or to be grouted in wall with the help of cement plaster, and finished as original. The Frame shall be painted prior to erection.
Mode of Measurement:
Executed quantity will be counted on number basis. (i.e. Each)

D)Metal clad TP/TPN Switches with HRC fuse (TPHRC)
Scope

Specification No.: (SW-SWR/TPHRC)

Supplying and erecting Metal clad TP/TPN switches with HRC Fuses of specified rating on angle iron frame of suitable size.

Material:
TP/TPN Switches: Combination fuse switch unit, Metal clad, Triple pole with Neutral link, Degree of Protection IP-2L3 as per IS: 13947 (pt.3) 1993.Quick make and break, Inter-lockable cover, uninterrupted duty, Utilization category AC-23A and confirming to IS: 13947 (Part.3) 1993. It shall be suitable for three high rupturing capacity equal to 80 KA (HRC) cartridge fuses confirming to IS: 13703 (Part.1) 1993 and IS: 13703 (Part.2/Section & 2) 1993 having rupturing capacity 80 KA minimum, with rated voltage 415 Volts, 50 Hz. AC with shrouded incoming contacts.
Enclosure: Made of CRCA sheet of thickness not less than 1.2mm.
Fuses: 80 kA High rupturing capacity fuses with ISI mark.
Mounting: Required size of angle iron / MS Flat.
Paint: Superior quality enamel paint of specified shade & colour, Red Oxide paint.
Hardware: SM screws, MS Nuts & bolts, rawl plug, wooden gutties etc.
Grouting material: Cement, Sand, Putty, Water, etc.

Method of Construction

The switch shall be erected at designated place duly mounted on suitable size of angle iron frame as per table no. 5.1/1 with the help of required nut bolt, washer, etc on frame/wall. The angle frame to be erected on wall with the help of screws, or to be grouted in wall with the help of cement plaster, and finished as original. The Frame shall be painted prior to erection.

Mode of Measurement: **Executed quantity will be counted on number basis. (i.e. each)**

Packing material: Rubber / Neoprene gasket
Paint: Red oxide paint /Primer, Enamel paint
Hardware: Nuts, bolts, washers, etc of required size & length.
Danger Board: GI Sheet danger board in Marathi & English or Screen printed sticker.

Method of Construction:

The bus bar chamber shall be fabricated from 16 SWG CRCA sheet with necessary clearance on all side as mentioned in Table No 5/1 duly painted with one coat of red oxide/primer and with 2 coats of Superior quality enamel paint of required shade. The earth stud shall be welded to the chamber. The bus bar shall be fixed on fabricated bracket (to be fixed on inner rear surface of the box), with minimum three porcelain / epoxy bus bar insulator minimum at both ends & at the centre of the bar (with distance of 45cms.between insulators), with minimum 40x8 mm MS nut bolt, spring washers, etc. The above method shall be adopted for all the 4 bars. The bar shall be vertically fixed in staggered manner so as to maintain clearance in between the bars as per Table No. 6.2/2. All the bars shall either be covered with colour coded PVC heat shrunk sleeves or wrapped with PVC insulation tape with colour coding. (i.e. R, Y, B, N). The chamber shall be fixed on 25x25x4 mm angle iron frame to make it sturdy. The chamber shall have minimum one hole per bus bar for fixing incoming cable, and required holes for the out going cables. The size of the bar either aluminium / copper for the required rating shall be as per Table No 6.2/1

Mode of Measurement:

Measurement will be on running metre basis of the length of the bus bar provided in the chamber. (i.e. per meter length of bus bar)

Table No 6.2/1

Dimensions of Bus bar chamber & Size & Number of Strips required for the corresponding current rating.

S.No.	Dimensions of Bus bar chamber Length, Height, Depth in mm	Aluminum /Copper bus bar length per phase in mm	Current rating in amperes	No. of Insulators (Epoxy /Porcelain) per bus	Recommended rectangular cross section			
					Aluminium		Copper	
					No. of strips per phase	Size in mm	No. of strip per phase	Size in mm
1	1150x400x150	1000	100	3	1	25x5	1	20x5
2	1150x400x150	1000	200	3	1	40x5	1	30x5
3	1150x400x150	1000	300	3	1	50x5	1	40x5
4	1150x500x300	1000	400	3	1	50x10	1	50x5
5	1150x500x300	1000	630	3	2	40x10	-	-
6	1150x500x300	1000	800	3	2	50x10	-	-

Table No 6.2/2

Minimum Clearance between Bus Bars in Bus Bar Chamber / Control Panel (IS: 4237-1967)

S.No.	Voltage level (kV)	Clearance in mm	
		Between Phases	Between Phase & Earth
1.	0.416	19	16
2.	0.6	25	19
3.	3.3	51	35
4.	11	127	77
5.	22	242	140
6.	33	356	223

CHAPTER-6

CABLES

6.1	LT Cables (Aluminium)	CB-LT/AL/
6.2	LT Cables (Copper)	CB-LT/CU
6.3	HT Cables	CB-HT/
6.4	Cable Joints, Termination Kit (LT)	CB-JT/LT
6.5	Cable Joints, Termination Kit (HT)	CB-JT/HT
6.6	Cable Enclosure (Pipes)	CB-CE/
6.7	Cable Glands	CB-GL/
6.8	Cable Lugs (Copper)	CB-CL/CU
6.9	Cable Lugs (Aluminium)	CB-CL/AL

Chapter 6:PVC/XLPE Cables (CB)

6.1, 6.2, & 6.3Armoured Cables (HT & LT)

1. General

All material shall conform to relevant standard as per BIS and shall carry ISI mark. If any particular category of material for which ISI mark is not available in market, it shall be as included in approved list.

Work shall be carried out as per the method of construction specified by BIS. If there is no reference for particular method of construction in IS, such work shall be carried out as per the approved method of construction specified in chapter 16 of P.W. Dept. Handbook.

Material and Work not qualifying to any provision mentioned above shall be to the satisfaction of the Engineer in Charge.

2. Cables: (Armoured)

The following list records those Indian Standards in force, which are acceptable as good practice, and accepted standards.

SP 30: 1984	:	National Electrical Code
SP 7 (Group 4): 2005	:	National Building Code
IS 1255: 1983		Code of practice of Installation & Maintenance of armoured cables up to 33 kV.
IS 3961: Part 2: 1967	:	Recommended current ratings of PVC cables.
IS 1554: Part 1; 1988	:	PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 1100 Volts.
IS 1554: Part 2; 1988	:	PVC Insulated (Heavy duty) Electric Cables; Part 1 for working voltages up to and including 3.3 kV to 11 kV.
IS 10810: Part 63; 1993:		Method for Test of cables, Part 63 Smoke density of electric cables under fire condition.

3 . Scope: (Armoured cables)

Specification No. (CB-LT/AL, CB-LT/CU, CB-HT)

Providing armoured cable of specified voltage level, size & specified conducting material (Aluminum / Copper) as per **Table no. 7/3** including required material, hardware's for erection and erecting on wall, ceiling, RCC slab or drawing the same through pole, pipe, laying in provided conduit, trench, ducts, trays as per approved method of construction including glands, lugs, etc.

4. Material:

Cables:

Cables shall be PVC for LT/MP and XLPE for HT as per Table no. 7/3 and of required construction, colour, shall carry ISI mark, IS No, manufacturer's name, size, duly embossed / screen printed at every metre and having the total count of progressive length in meter at each mark.

Earth wire: Galvanized Iron (G I) wire of appropriate gauge as per Table No 7/1.

Glands: *As per specification* ***(CB-GL)***

Lugs: As per specification **(CB-CL/AL, CB-CL/CU)**

Saddles: Saddles fabricated from GI sheet of required gauge and size depending on dia of cable either galvanized or painted with superior quality enamel black paint with necessary shearing mechanical strength, semi circular shaped with extended piece having suitable holes for fixing.

G I Strip: 22 g x 25 mm width G I Strip.

Clamps: MS Clamps fabricated of required length and shape, having the size of 3/6 mm thick mild steel having 25/50 mm width (as per size of cable), rounded ends with wooden / resin cast grip for holding the cable.
Identification tags: For identifying root, connection position GI strip with identification mark / name embossed / painted with arrangement to tie should be fix on cable or arrangement of ferrules to be done.
Hardware: Sheet Metal (SM) screws of required sizes, plugs / wooden gutties, etc.
k the cable in the bent portion, shall be buried along the route of cable in the trench made for laying the cable. For clear visibility, the Cable indicator plate shall be buried in such a manner that the plate should be minimum 200 mm above the ground level and shall be provided at every 15-25 metre in straight run, at both ends of road crossing and immediate before and after turning point of cable.

Mode of Measurement:
Executed quantity will be measured on number basis. (I.e. each).

Chapter 7

EARTHING

7.1	Plate, Pipe	EA-EP/
7.2	Accessories	No Specs

Chapter 7 Earthing (EA)

9.1 Plate / Pipe type Earthing

A) **Plate type Earthing (With or Without CI Cover, Funnel, etc)** **(EA-EP)**

Scope:

Specification No(EA-EP)

Supplying and erecting galvanised cast iron / copper earth plate type / G.I. pipe type earthing ***with / without C.I. cover*** *as per instructions from the site engineer.*

Material:
Earth Plate: *Galvanised cast iron / Copper earth plate or G.I. pipe as per specifications given in Table No 9.1/1.*
CI Cover: *As per specifications given in Table No 9.1/1.*
Earthing Conductor: *Copper/G.I strip/Annealed bare copper wire/G.I. earth wire of size as per specifications given in Table No 9.1/1.*
GI Pipe: *As per specification* ***(CW-PLB/GP)*** *mentioned chapter no. 17.5 for watering, and as enclosure for Earth wire, refer specifications given in Table No 9.1/1.*
Hardware: *Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' nails and material as per specifications given in Table No 9.1/1.*
Filling material: *Coal /Charcoal/ salt as per specifications given in Table No 9.1/1. as per specifications given in Table No 9.1/1.*
Lugs: *As per specification* ***(CB-LG/AL, CB-LG/CU)*** *mentioned chapter 7.9 & 7.10 Copper/ Aluminium lugs as per specifications given in Table No 9.1/1.*

Method of construction:

Pit is to be dug of required dimension and depth for the earthing at site, and laying of Galvanised cast iron / Copper earth plate or G.I. pipe shall be as per Table No 9.1/1. The earth connection to equipment/ switch gear and earthing electrode shall be connected as shown in the diagram and as per IS 3043 amended up to-date. The connections shall be made either by strip or double run of earth wire with drilling, welding, riveting, brazing and nut bolting to plate or pipe, where ever required in an approved manner. As far as possible continuous strip shall be used, but where ever jointing of strip is unavoidable, the overlap portion must not be less than $2^{1/2}$ times the width of the strip either welded/ brazed/soldered by all sides or 6 inches overlap with two nut bolts/ riveting of adequate size with required washer and covered by anti-corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in charge.

Pit shall then be filled with screened soil with alternate layer of coal and salt, and if, necessary brick masonry work (Where ever applicable) shall be done as specified in IS: 3043, with laying wires in PVC/ G.I. pipe and watering arrangement as per drawing no EA-1 and covered with C.I. Cover (Where ever applicable).
Where ever requires or as specified by Site Engineer, a Test link shall be provided for facilitating the testing of resistance of earth electrode.

Testing:
The value of each earth electrode shall be measured by earth tester in presence of site Engineer and record to be submitted.

Mode of Measurement: Executed quantity will be measured on number basis (i.e. each)

Table No 9.1/1
Detailed Specifications of various types of Earthing

Type of earthing ---------->		Galvanised cast iron earth plate type without C.I cover	Copper earth plate type with C.I cover	Galvanised cast iron earth plate type with C.I cover	Pipe type earthing with out C.I cover
S.No.	Particulars				
1)	**Depth from top of plate Up to Ground level**	1.5 m	1.5 m	1.5 m	1.5 m
2)	**Size & type of material for pipe / Plate type earthing.**	Cast iron earth plate size 60x60x0.6 cms	Copper earth plate size 60x60x0.6 cms	cast iron earth plate size 60x60x0.6 cms	'B' grade G.I. pipe 40mm. dia. 2.5 mtr. Long or 20 mm dia. G.I. Rod
3)	**Salt/charcoal**	30 Kg. charcoal and salt each	30 Kg. charcoal and salt each	40 Kg. charcoal and salt each	N A
4)	**Type of Wire**	Double G.I. wire 8 SWG	Double G.I. 8 SWG	Double G.I. 6 SWG	double G.I. 8 SWG
5)	**Wire enclosure**	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2 mtr. Long	12mm. dia. G. I. pipe 2.5 mtr. Long	N A
6)	**Nut bolts**	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	12 mm dia. Cadmium / GI	N A
7)	**Washers**	GI	GI	GI	N A
8)	**Watering pipe**	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	19mm. dia. G.I. pipe	N A
9)	**Lugs**	Yes	Yes	Yes	Yes

10)	**funnel**	No	yes	yes	N A
11)	Brick Masonry	No	yes	yes	N A

B) Low Impedance Earthing (Pipe in pipe technology) (EA-EPP)

Scope:

Specification No (EA-EPP)

Supplying and erecting approved type earthing system with **Pipe in pipe technology** with necessary ancillary materials and complete erection as per instructions from the site engineer

Material:

GI Pipe: As per specification no. **(CW-PLB/GP)** mentioned chapter 17.5;
1. 50 mm dia x 3 meter long (In place of traditional GI pipe Earthing), for LV / MV applications.

Or

2. 80 mm x 3 meter long (In place of traditional copper plate Earthing), for HV/EHV applications.
Earthing Conductor: *G.I strip/GI earth wire of size as per specifications given in Table No 9.1/1.*
GI Pipe: *As per specification no.* ***(CW-PLB/GP)*** *mentioned chapter 17.5 for watering and as enclosure for Earth wire, as per specifications given in Table No 9.1/1.*
Hardware: *Screw / nut bolts with required washer of dimensions, Rawl plug / clip/ 'U' Nails and material as per specifications given in Table No 9.1/1.*
Filling material: *Coal /Charcoal/ salt as per specifications given in Table No 9.1/1. as per specifications given in Table No 9.1/1.*
Lugs: *As per specification no.* ***(CB-LG/AL, CB-LG/CU)*** *mentioned in chapter 7.9 & 7.10 for Copper/ Aluminium lugs and as per specifications given in Table No 9.1/1.*

Method of construction:

Earthing Pipe in pipe technology with ancillary materials shall be done by digging an 8" / 10" dia hand bore 10.5' deep sufficient to install the electrode in normal soil conditions. The space between the soil and the electrode is filled up with electrolyte material mixed with the dug out mother soil, along with water and tightly packed up to the base of the terminal. In rocky areas and under hard soil and sandy soil conditions the method of installation will be as specified by manufacturer. Installation shall include drilling, welding, reverting, brazing and nut bolting pipe when ever required in an approved manner with required material such as nut bolts and washer etc. and with necessary brick masonry work as per the specification. (As per IS 3043 amended up to-date). As far as possible continuous GI strip shall be used but when ever jointing of strip is un avoidable, the jointing over lap portion must not be less than $2^{1/2}$ times the width of the strip either welded/ brazed/soldered by all sides or overlap of 6 inch with two nut bolts/ riveting of adequate size with required washer and covered by anti corrosive paint as per approved jointing practice in the industry and as per directives from site engineer in-charge.

Testing:
The value of each earth electrode shall be measured by earth tester and record to be submitted. (Also refer drawing No. EA-2)

Mode of Measurement: Executed quantity will be measured on number basis i.e. each

Chapter 8

CIVIL WORK

9.1 Excavation (EXN)

A) Cable Trench (CTR)

1. General

This part of specification deals with the preparation of trenches in soft soil, hard murum, BT road, and laying of cables inside the trench, etc as per IS: 1255.

2. Scope:

Specification No (CW-EXN/CTR)

Excavating in all types of soil strata and making trench for laying cable/cables, providing sand bed for laying the cable, covering cable with specified material as per requirement, and finishing the same by making the surface proper with crown on top of the trench.

The following list shows Indian Standards, which are acceptable as good practice, and accepted standards.

SP 30: 1984	:	National Electrical Code
SP 7 (Group 4): 2005	:	National Building Code
IS 1255: 1967	:	Code of practice of Installation & Maintenance of armoured cables up to 33 kV.

3. Material:

Bricks: Solid Clay bricks of minimum size 225x110x62.5 mm (L x B x H), burnt in the kiln, of good quality.

Sand: Screened sand of good quality.

4. Method of Construction:

Trench in Soft soil / Hard Murum / Tar road: Single run of cable

Before excavating the soil for preparing trench, route of cable laying shall be got finalized from the site in-charge. Trench of minimum 300 mm width shall be excavated up to minimum depth below the ground surface as per Table No 17.1/1 Bottom of the trench should be carefully levelled and freed from stones. Cable duly straightened shall be laid flat

and embedded in the 200 mm layer of screened sand at the bottom of the trench. Bricks shall be laid all over the run of cable as specified below:

Lengthwise for cable up to and including 10 Sqmm of all cores.

Width wise for cable above 10 Sqmm of all cores.

Remaining portion of the trench shall be back filled with the excavated material after removing stones and sharp / hard material, and making the surface proper. Crown of 150 mm shall be provided over the trench. The remaining excavated material shall be removed from site and dumped in scrap yard of Local authorities or at suitable place.

Trench in Soft soil / Hard Murum / Tar road: Two or more cables run of cable

Before excavating the soil for preparing trench, route of cable laying shall be got finalized from the site in-charge. Trench of minimum required width more than 300mm. shall be excavated up to minimum depth as per Table No 5, below the ground surface. Bottom of the trench should be carefully levelled and freed from stones. Cables duly straightened shall be laid flat and embedded in the 200 mm layer of screened sand. The inter-axial distance between two cables shall be between 230 and 400 mm. at the bottom of the trench. Bricks shall be laid all over the run of cable as specified below:

Lengthwise for cable up to and including 10 Sqmm of all cores.

Width wise for cable above 10 Sqmm of all cores.

Remaining portion of the trench shall be back filled with the excavated material after removing stones and sharp / hard material, and making the surface proper. Crown of 150 mm shall be provided over the trench. The remaining excavated material shall be removed from site and dumped in scrap yard of Local authorities or at suitable place.

Trench in Soft soil/Hard Murum/Tar road with half round Hume pipe:

(For cables of size 25 Sqmm. and above shall be covered by min. 150 mm. dia. of RCC Hume pipe)

Before excavating the soil for preparing trench, route of cable laying shall be got finalized from the site in-charge. Trench of minimum required width more than 300mm. shall be excavated up to minimum depth as per Table No 5, below the ground surface. Bottom of the trench should be carefully levelled and freed from stones. Cables duly straightened shall be laid flat and embedded in the 200 mm layer of screened sand. The inter-axial distance between two cables shall be between 230 and 400 mm. at the bottom of the trench. Inverted 150mm. dia. Half round RCC Hume pipe shall be laid above full length of cable. For more than one cable higher size or more number of Hume pipes are to be provided.

Remaining portion of the trench shall be back filled with the excavated material after removing stones and sharp / hard material, and making the surface proper. Crown of 150 mm shall be provided over the trench. The remaining excavated material shall be removed from site and dumped in scrap yard of Local authorities or at suitable place.

As per 3.1 above, in place of bricks, the cable of size 25 sq.mm and above shall be covered with 150 mm dia. half round Hume pipe.

4.4 Mode of Measurement:

Executed quantity shall be measured on the basis of running meter per run of cable.

Table No 17.1/1
Minimum laying Depth of cables (IS: 1255)

S.No	Voltage level of cables	Minimum depth from top of the cable
1	Up to 1.1 kV	750 mm
2	3.3 kV to 11 kV	900 mm
3	22 kV to 33 kV	1050 mm
4	At road crossing	1000 mm
5	At railway crossing (from Bottom of sleepers to Top of pipe)	1000 mm

Chapter 09 OTHER TECHNICAL SPECIFICATIONS

1 LED Lamps:

lamp is a light-emitting diode (LED) product which is assembled into a lamp (or light bulb) for use in lighting fixtures. LED lamps have a lifespan and electrical efficiency which are several times longer than incandescent lamps, and significantly more efficient than most fluorescent lamps. LEDs come to full brightness without need for a warm-up time; the life of fluorescent lighting is also reduced by frequent switching on and off.

LEDs are "directional" light sources, which means they emit light in a specific direction, unlike incandescent and compact fluorescent bulbs, which emit light and heat in all directions.
The chart below shows the amount of brightness in lumens you can expect from different wattage light bulbs. The LED bulbs require much less wattage than the CFL or Incandescent light bulbs.

Incandescent Watt	CFL Watts	LED Watts	Lumens (Brightness)
40	8 - 12	6 - 9	400 - 500
60	13 - 18	8 - 12.5	650 - 900
75 - 100	18 - 22	13+	1100 - 1750
100	23 -30	16 - 20	1800+
150	30 - 55	25 - 28	2780

16-20 W ROUND LED DOWNLIGHT

Features

- Aluminium pressure die cast (PDC) body with decorative trim
- Industry best light output with LM80 tested SMD LEDs
- Effective thermal management with aluminium PDC heat sink
- Robust driver with wide voltage range 100-240VAC and inbuilt protection
- Recessed mount, protected from dust and insects

Specifications

Code	D521665	D522065
Wattage	16	20
Colour Temp. (K)	6500	6500
Lumens (lm)	1200	1450
Voltage (VAC)	240	240
Cut Out Φ (mm)	140	140

5W-9W LED BULB

Features

- Saves 80% energy with life up to 10 years
- Industry best light output with wide light distribution > 200°
- Robust driver with wide voltage range 100-240VAC and inbuilt protection
- Light weight and decorative look fits in CFL sockets

Specifications

Code	N50001	N90002
Wattage	5	5
Colour Temp. (K)	6500	6500
Lumens (lm)	450	840
Voltage (VAC)	240	240
Beam Angle	240°	220°

5W LED Mirror Light

Features

- Slim LED Batten in Aluminum housing and decorative end caps
- Industry best light output, with spot free illumination
- Effective heat dissipation with extruded aluminum heat sink
- Robust driver with wide voltage range 100-240VAC and inbuilt protection
- Wall mounted, protected from dust and insects

Specifications

Code	D530565	D530527
Wattage	5	5
Colour Temp. (K)	6500	2700
Lumens (lm)	380	360
Voltage (VAC)	240	240

LED Strip Light

An LED Strip Light (also known as an LED tape or ribbon light) is a flexible circuit board populated by surface mounted light-emitting diodes (SMD LEDs) and other components that usually comes with an adhesive backing. Traditionally, strip lights had been used solely in accent lighting, backlighting, task lighting, and decorative lighting applications. Increased luminous efficacy and higher-power SMDs have allowed LED strip lights to be used in applications such as high brightness task lighting, fluorescent and halogen lighting fixture replacements, indirect lighting applications, Ultra Violet inspection during manufacturing processes, set and costume design, and even growing plants.

Application

Strip lights are designed for both indoor and outdoor use depending on whether they're water resistant. Since the strip is flexible and can be divided at any point between LEDs, it is extremely versatile and can be used in a number of installations. Outside of traditional lighting, strip lighting is extensively used in DIY projects or lighted clothing.

2 Wall-mounted PIR Occupancy Sensor for A.C

Wall-mounted PIR Occupancy Sensor employs passive infrared (PIR)technology will scan the room for occupancy using Passive Infra-Red (PIR) technology to accurately detect occupancy. As the sensor will only detect body heat it will not therefore be affected by items such as ceiling fans, or curtains. When no occupancy has been detected, after a preset time delay (either 15, 30 or 45 minutes), a signal will be transmitted to the AC to switch it off. On re-entering the room, if air conditioning is required, the occupant simply turns the air conditioner back on using the normal remote control.

After the occupant has left the room, Sensor will continue to scan the room for a preset time - 15.30 or 45 mins before sending the signal to turn off the Air Conditioner

3 UV Mosquito Lamp.

Mosquito Lamp, more formally called an electrical discharge insect control system, electric insect killer or (insect) electrocutor trap, is a device that attracts and kills flying insects that are attracted by light. A light source attracts insects to an electrical grid, where they are electrocuted by touching two wires with a high voltage between them. The name comes from the characteristic onomatopoeic zap sound produced when an insect is electrocuted.

LIST OF APPROVED MATERIALS

Unless otherwise mentioned specifically only the following approved make / brands of various electrical accessories will be used. In case, there are two types of product under one brand name then product having I.S.I mark shall be used. In case, the approved brands are not available in the market then, equivalent product conforming to relevant standards, as approved by the Engineer in charge shall be used.

Sr. No		Item Description	Makes/Brand
1.		L.T. Switchgear	
	A)	Enclosed in sheet steel with H.R.C. fuses for 63A and above	L&T/ Siemens/Schneider/Legrand/Standard/Havells
	B)	Cast Iron with rewirable fuses	KEW/ CPL/ Kalki/ L&T/ Siemens/Schneider/Legrand/Standard/Havells
	C)	Circuit Breakers (Moulded Case)	Legrand/ Havell's/ Schneider/ L&T/Standard
	D)	Miniature Circuit Breakers	Legrand/ Havell's/ Schneider/ L&T/Standard
	E)	Cubical Panel Switchgear Accessories	
	I)	TPN / DP Switches / Isolators	Legrand/ Havell's/ Schneider/ L&T/Standard/Siemens
	II)	Rotary CAM type, Selector Switch	Siemens / AEI/ Kaycee/L&T
	III)	Start / Stop push Button stations	L&T/ Siemens/ Havell's/ Schneider
	IV)	Contactors	L&T/Siemens/Schneider
	V)	Indicating Lamp	Siemens/ Vaishno/Teknic
	VI)	RCCB/RCBO	Legrand/Havell's/Schneider/L&T/ Standard/Seimens
	VII)	HRC Fuse	Siemens/ L&T/ GE/Havells/Legrand/Schneider
2.		Distribution Boards with MCB's	Legrand/ Havell's/ L&T/ Siemens/Schneider/Standard
3.		XLPE Armoured Cables	Polycab/ Havell's/Finolex/RR Cable/KEI Cables
4.		Socket / Lugs	Dowells/Jainson/ Braco
5.		PVC wires (FR & FRLSH)	Polycab/ Havell's/Finolex/ RR Cable/KEI Cables
6.		Conduit	
	A)	M.S. Black and G.I. Conduit	Precision/ Diamond/ BEC
	B)	HMS PVC Conduit and accessories	Precision/ Diamond/ BEC

S/ R. CHAVAN
मुख्य प्रबंधक (विशेष प्रमुख-तकनिकी सेवाएँ-इलेक्ट्रिकल)
CHIEF MANAGER (HOS-TS-ELECTRICAL)
माझगांव डॉक शिपबिल्डर्स लिमिटेड
MAZAGON DOCK SHIPBUILDERS LIMITED

7.		PVC casing-n-capping and PVC casing-n-capping accessories	Precision/ Modi's/ Presto-plast
8.		Screws	Precision Fastners
9.		Piano switches flush mounting (5 to 15 A) / wall sockets & plugs (surface mounting), Modular switch & sockets /Modular Plates & Boxes(5 to 15 A)/ holder pendant / batten / angle, three plate ceiling rose (for 3 core twisted flexible wire), 30 A D.P. Ticcino type switch fuse with indicating lamp, bell push surface mounting, flush mounting	Legrand/ Anchor Roma/ MK/L&T/Press-Fit
10.		Wall Socket and plug Metal clad (ray roll type)	Legrand/ Crompton Greaves/ Havell's/L&T/SEIMENS/Schneider
11.		Special Accessories concealed / decorative (plate switches)	Roma/ Precision/CPL/ Anchor/Legrand/Honeywell MK
12.		LED Lamp	Havells/Crompton/Wipro/ Bajaj/Oreva/Pressfit Lighting/LEDVANCE/PHILIPS
13.		LED Indoor Luminaries	Havells/Crompton/Wipro/ Bajaj/Oreva/Pressfit Lighting/LEDVANCE/PHILIPS Havells/Crompton/Wipro/ Bajaj
14.		Street Light LED Fitting/ Bollards	Havells/Crompton/Wipro/ Bajaj/Oreva/Pressfit Lighting/LEDVANCE/PHILIPS Havells/Crompton/Wipro/ Bajaj
15		Fans	Almonard/ Crompton/ Bajaj/Usha/Atomberg
	A)	Exhaust Fans / Pedestal Fans /Air circulators	Almonard/ Crompton/ Bajaj/ Usha/Atomberg
	B)	Sweep Ceiling Fans with double ball bearings	Almonard/ Crompton/ Bajaj/ Usha/Atomberg
	C)	Table Fans /wall mounting Fans / cabin fans	Almonard/ Crompton/ Bajaj/ Usha/Atomberg
16		Storage / Instant Water Heater with thermostatic control	Racold /Almonard /Crompton /Bajaj
17		XLPE Flexible Cables	Polycab/ RR Cable/ Havells/ Finolex/KEI Cables
18		FRLSH cables	Rallison/ Finolex/ Polycab /KEI/RR Cable
19		G.I. Cable tray	Bravo Trays / SV Metal
20		MCCB/MCB Vari -depth handle (Rotary handle)	Legrand/ Havells/ Schneider/ L&T/ Indo Asian /Standard
21		MCB Terminals	Elemex/ Connectwell /KEW/ Bentec
22		MCCB spreaders link	Legrand/ Havells/ Schneider/ L&T/ Indo Asian /Standard /Schmens

S. Y. Sawant
मुख्य प्रबंधक (विभाग प्रमुख-तकनीकी सेवाएं-इलेक्ट्रिकल)
CHIEF MANAGER (HOS-TS-ELECTRICAL)
माझगांव डॉक शिपबिल्डर्स लिमिटेड
MAZAGON DOCK SHIPBUILDERS LIMITED

23		Indication LED	Teknic/ Vaishno / L&T
24		Industrial Switch & Sockets with Enclosure	Neptune/Legrand/ Schneider/Havells
25		Terminal Block	Elmex/ Everest/ Jyoti
26		Meters: Ammeter & Voltmeter (Analog)	Automatic Electric/ Meco
27		G.I. Pipes	Zenith/ Diamond
28		Fan's Electronic Step Regulator	Legrand/ Anchor/Rider/ Cona
29		Fluorescent Tube 28W T5 (4 ft or 3 ft or 2 ft)	Havells/Crompton/Wipro/ Bajaj/Oreva/Pressfit Lighting/LEDVANCE/PHILIPS Havells/Crompton/Wipro/ Bajaj
30		Cable Trays and its accessories	Legrand's/ Asian Ancillary Corporation
32		NETWORK RACK	PENDUIT/RITAL/PRESIDENT
33		PATCH PANEL	MOLEX PREMIUM /PENDUIT/D Link
34		CAT 6 Cable	MOLEX/ENERCON / LAPP INDIA/LEGRAND/D-Link
35		Fibre Optic cable and Accessories	Amp / Legrand / D- Link / Systemax /Molex/Polycab/KEI/Finolex/Havells/RR Cables
36		Fiber LIU & accessories	Amp / Legrand / D- Link / Schneider/ Systimax
37		COAXIAL TV CABLE	DELTON / POLYCAB / FINOLEX
38		TELEPHONE CABLE	DELTON /POLYCAB/FINOLEX
39		MDF Box	Krone/ITI/Equivalent
40		Krone Module	Krone/ITI/Equivalent
41		Call Bell System	Forbix semicon/SBI/NN
42		Flame Proof Accessories	Prateek/ Connectwell/Phoenix/Sudhir switchgear/Bajaj/Baliga,FCG
44		Batteries	Exide/Amron/Standard/Luminous
45		HDMI CABLE	POLYCAB / FINOLEX / D-LINK/Legrand/Havells/KEI Cables

S. R. CHAVAN
मुख्य प्रबंधक (विभाग प्रमुख-तकनिकी सेवायें-इलेक्ट्रिकल)
CHIEF MANAGER (HOS-TS-ELECTRICAL)
माझगांव डॉक शिपबिल्डर्स लिमिटेड
MAZAGON DOCK SHIPBUILDERS LIMITED

Page 3 of 3

Enclosure-22

HINDRANCE REGISTER

1. Name of the Work: .....
2. Contract Agreement No. : .....
3. Date of Commencement: .....
4. Stipulated Date of Completion: .....
5. Extended Date of Completion, if applicable: .....
6. Name of the Supplier / Contractor:..... .....

Sr. No.	Nature of Hindra-nce	Activity of work affected	Date of notification by contractor	Name & Signature		Action Taken	Date of removal of hindrance	Name & Signature	
				Contractors Represen-tative	Site Executive of MDL			Contractors Represen-tative	Site Executive of MDL

Enclosure-23

To,
OTS DEPARTMENT

OTS-TS SECTION

MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

Mazagon Dock Shipbuilders Ltd.

Loss of Pass - Contractor/Vendors.

1. Penalties will be imposed towards loss of passes/ non-renewal of passes apart from warning as deemed necessary for contractors, vendors & their workers. This is in addition to cost of the pass prescribed from time to time.

   Loss:

   a) First loss – Rs. 250/-
   b) Second loss - Rs. 500/-
   c) Third loss - Rs. 1000/- and permanent cancellation

   Non-Renewal:

   a) Upto 4 days- No Penalty
   b) 5-10 days- Rs. 5/- per day
   c) 11 days & beyond- Rs. 50/- + Rs. 10/- per day

2. **Procedure for duplicate pass due to loss:**
   The loss has to be immediately reported to the concern Police Station. Thereafter a statement narrating circumstances of the loss, countersigned by the contractor and EIC shall be submitted to security office along with the prescribed penalty.

Enclosure-24

माझगांव डॉक शिपबिल्डर्स लिमिटेड

बाह्यस्त्रोत-तकनीकी सेवाएँ विभाग

INVOICE CERTIFICATION

HOD (OTS)

Ref No.: **Date:**

Firm's Name: M/s. _____ **RA Bill No:** _____

A. Contract Details:

1. Subject: _____
2. MDL P.O. No: _____ dated: _____ Value: _____
3. PO Original Delivery date: _____Extended Delivery Date (if any): _____
4. Contractor All Risk Policy vide No._____ date.: _____ for an amount of Rs_____ Valid till dated_____
5. Performance Bank Guarantee/ Security Deposit vide No. _____ dated: _____ Rs._____Valid till_____
6. Stamp Duty Paid vide Challan No._____ Rs._____

B: Invoice Details:

1. Firms Invoice No: _____ dated_____
2. Period of Work: From_____To_____

S.N.	Description	Amount in Rs.
1.	RA Bill Amount	
2.	Price Variation Amount	
3.	**Total**	

C. Certification Details:

The following have been appended along with the GST Tax Invoice:

1. MDL service entry sheets duly signed attached : Yes/ Not Applicable
   Service Entry Sheet No_____
   EMB No._____
2. Consultant's Certificate (if applicable) : Yes/ Not Applicable
   Reference No. _____Dated: _____
3. E-invoice/Vendor's Self Declaration: Yes/ Not Applicable
4. No Claim Certificate (applicable for Final Invoice only) : Yes/ Not Applicable
5. Vendor rating (applicable for Final Invoice only): Yes/ Not Applicable
6. Actual Local Content Certificate (applicable for Final Invoice only) : Yes/Not Applicable
7. Price indices & Price Variation sheet (if price variation is included) : Yes/ Not Applicable
8. Bank Guarantee against Waterproofing/ Leakages (applicable for Final Invoice only) : Yes/ Not Applicable
9. The following deductions to be made from the invoice:
   a) Liquidated Damages as per purchase order : To be levied/Not Applicable Details of LD to be levied (if applicable):_____
   b) Other Deductions (if any): _____
   c) Release of Provisional Retained Amount (if any): _____

Engineer in Charge / HOD (Comm)	**Cnsultant**	**Contractor**
(Sign & Stamp with date)	(Name, Sign & Stamp with Date)	(Name, Sign & Stamp with Date)

Enclosure-25

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

EXTRACT OF PROVISIONS OF THE OFFICIAL SECRETS ACT, 1923

SECTION 2(B) ; "PROHIBITED PLACE"

It is defined as the place of any work of Defence Dockyard and other so belonging or occupied and used for the purpose of building, repairing, making or storing any ammunitions of war.

For the purpose of the above definition, sketch includes any photograph or other mode of representing any place or thing.

SECTION 3 : "PENALTIES FOR SPYING"

If any per unlawfully -

a) approaches, inspects, passes over or is in the vicinity of any clear place; or
b) make any sketches intended to be directly or indirectly useful to an enemy; or
c) obtains, collects, records or communicates to any other person any secret official code.

Shall be liable for imprisonment of 14 years in case of Defence Installation.

SECTION 4 : "COMMUNICATION WITH FOREIGN AGENTS"

If Any person has been in communication with or attempted to communicate with foreign agents regarding the vital information of any "PROHIBITED PLACE" would be guilty of violating the provisions of this Act.

SECTION 5 : "WRONGFUL COMMUNICATION OF INFORMATION"

If any person having in his possession or control any official document;

a) Willfully communicates to any person, other than a person, who is authorised to communicate it.
b) Used the information in his possession for the benefit of any foreign power.
c) Retain in his possession when he has no power to retain it
d) Fails to take reasonable care of it.

Shall be guilty of an offence under this Act.

SECTION 6 : "UNAUTHORISED USE OF UNIFORMS"

If any person for the purpose of gaining admission or of assisting any other person to gain admission to a "PROHIBITED PLACE" wears uniforms without lawful authority shall be guilty of offence under this Section.

SECTION 7 : "INTERFERING WITH OFFICERS OF POLICE"

No person in the vicinity of any "PROHIBITED PLACE" shall obstruct any Police Officer engaged on guard, sentry or similar duty. If any person moves in the provisions of this section, shall be punishable with imprisonment, which may extend up to 3 years.

SECTION 8 : "DUTY OF GIVING INFORMATION"

It shall be duty of every person to give on demand to a superintendent of Police or any other Police Officer not below the rank of Inspector, any information in his power relating to an offence under this Act.

If any person fails to give such information, shall be punishable with imprisonment to 3 years or fine or with both.

SECTION 9 : "INCITEMENT"

Any person who attempts to commit or debate the commission of an offence under this Act shall be punishable with the same punishment and be liable to be proceeded against in the same manner as if he had committed such offence.

SECTION 10 : "PENALTY FOR HARBOURING SPIES"

If any person whom he knows or has reasonable grounds for supposing to be person who is about to commit or who has committed offence under this Act shall be guilty of offence under this Section.

SECTION 11 : "SEARCH WARRANTS"

If a presidency Magistrate, Magistrate First Class or Sub-Divisional magistrate is satisfied with the information that there is reasonable ground for suspecting that an offence under this Act has been or is about to be committed, he may grant search warrant to any Police Officer to enter at any time any premises to force to search premises or the places.

_**********_

Enclosure-26

To,
OTS-TS SECTION
OTS DEPARTMENT
MAZAGON DOCK SHIPBUILDERS LIMITED.

MDL Tender No. 1900000242

CHECKLIST OF SUBMITTALS ATTACHED ALONGWITH ONLINE TECHNICAL BID
TENDER ENQUIRY No. 1900000242

Bidder to indicate Submitted/ Not submitted and Yes / No under relevant Column and Reasons for Non submissions if any

Sl No	Submittals (Scanned Copy)	Whether Submitted/ Not Submitted/ Not Applicable	Bidder to indicate the Reasons below for Non Submissions if any, or if they have indicated "NO" under relevant columns
1	Enclosure-1 viz Form of undertaking	Yes/ No	
2	Enclosure-2 viz TEF Acceptance Form	Yes/ No	
3	Enclosure-3 viz General Construction Work	Yes/ No	
4	Enclosure-4 viz GCC Acceptance Form	Yes/ No	
5	Enclosure-5 viz Deviation Form	Yes/ No	
6	CA certified Average Audited Annual financial turnover of Past 03 years ending 31 March 2024		
7	Audit certified Balance Sheets of Past 03 years ending 31 March 2024		
8	Audit certified Profit/Loss Accounts of 03 years ending 31 March 2024		
9	a. Enclosure-6 & 7 viz Bidding Capacity		
	b. Whether Enclosure-6 Certified by CA	Yes/ No	
	c. Whether Enclosure 7 Certified by CA	Yes/ No	
10	Enclosure-8 viz Exp in Similar Projects		
	a. Work Orders along with Scope of work and BOQ		
	b. Completion Certificates issued / authenticated by Client		
	c. TDS Copy in case of Work Completion Certificate issued by Private firm		
11	Enclosure-9 viz Key Personnel for this Project		
12	i) **Enclosure-10(A)** viz. Declaration certificate for Local Content		

Sl No	Submittals (Scanned Copy)	Whether Submitted/ Not Submitted/ Not Applicable	Bidder to indicate the Reasons below for Non Submissions if any, or if they have indicated "NO" under relevant columns
	a. Whether Tender Item Sl No indicated at Col I of **Para (d) of Enclosure**	Yes/ No	
	b. Whether Local Content Percentage indicated at Col II of **Para (d) of Enclosure**	Yes/ No	
	c. Whether Location of Value addition indicated at Col III of **Para (d) of Enclosure**	Yes/ No	
	d. Whether Enclosure-10(A)viz. Declaration Certificate for Local Content has been signed by **Authorized Signatory** as indicated at **Tender Clause No. 40.4(i)**	Yes/ No	
	ii) Enclosure-10(E) viz Declaration in respect of restriction under Rule 144 (xi) of the General Financial Rules (GFRs), 2017	Yes/ No	
	iii) Enclosure-10(F) viz Declaration in respect of of debarred under Public Procurement Policy (PPP) Make In India (MII) order 2017	Yes/ No	
13	Enclosure-11 viz Declaration for Banned or delisted Tenderer	Yes/ No	
14	Enclosure-15 viz EMD Format	Yes/ No	
15	Enclosure-13 - Integrity Pact	Yes/ No	
16	a. Enclosure-14 viz RTGS Form	Yes/ No	
	b. Whether RTGS form is duly authenticated by any Bank	Yes/ No	
17	a. Solvency Certificate	Yes/ No	
	b. Whether Solvency Certificate is issued within 1 Year from Tender date	Yes/ No	
	c. Whether Solvency is issued by a Scheduled Commercial (i.e. Indian or Foreign Banks included in the Second Schedule of Reserve Bank of India Act, 1934 excluding Co-operative banks or Regional Rural Banks).	Yes/ No	
18	GST Registration Certificate	Yes/ No	
19	PAN CARD	Yes/ No	
20	a. Shop & Establishment Registration Certificate or Certificate of Incorporation from Registrar of Companies or Registrar of firms registration certificate from local body/Factory license.	Yes/ No	

Sl No	Submittals (Scanned Copy)	Whether Submitted/ Not Submitted/ Not Applicable	Bidder to indicate the Reasons below for Non Submissions if any, or if they have indicated "NO" under relevant columns
	b. Whether Shop and Establishment Certificate is valid as on date of submission	Yes/ No	
21	Company Profile	Yes/ No	
22	Power of Attorney	Yes/ No	
23	Corrigendum, if any	Yes/ No	
24	Enclosure-29-Declaration in respect of Conflict of Interest among Bidders/ Agents	Yes/ No	
25	Document related to Working Capital	Yes/ No	
26	Bidder have valid ESIC code as per ESIC act and PF code	Yes/ No	

The Bidder hereby declares that in case any of the above submittals are **not submitted/ not appended** along with the tender bid or the bidder have indicated "**No**" against any of the above submittals, MDL reserves the right to disqualify their bid for incomplete submission of the documents without assigning any reasons. The bidder shall be responsible for the incompleteness of their bid.

SIGNATURE _____

NAME _____

DESIGNATION _____

COMPANY SEAL COMPANY _____

DATE _____

Enclosure-27

Address Label

Please cut & Affix Address label given below on the envelope for sending EMD and Integrity Pact

✂==========✂==========✂

Sub: **Biennial Rate Contract 2025-2027 for Electrical Works Including minor civil works within MDL premises located at Dockyard Road, Sewree, Anik Chembur, Gavhan, Nhava Yard, South Yard Annex., Residential Quarters at Dockyard Road and Navi Mumbai including works at Naval Dockyard.**

Ref: **MDL Tender No.1900000242**

EMD & INTEGRITY PACT

To,

Head of Department (OTS),
OTS Department,
OTS-TS Section
6th Floor, Service Block Bldg., NY.
Mazagon Dock Shipbuilders Limited,
Dock Yard Road, Mumbai – 400010.

From,

✂==========✂==========✂

Enclosure-28

माझगांव डॉक शिपबिल्डर्स लिमिटेड

तकनीकी सेवाएँ विभाग

Certification for Disposal of Scrap/Debris

Biennial Rate Contract 2025-2027 for Electrical Works Including minor civil works within MDL premises located at Dockyard Road, Sewree, Anik Chembur, Gavhan, Nhava Yard, South Yard Annex., Residential Quarters at Dockyard Road and Navi Mumbai including works at Naval Dockyard.

Ref: MDL Tender No. 1900000242

RA NO.:

This is to certify that there is no accumulation of scrap/debris at site in sizable quantum, in respect of the works carried out for the subject work, as on date.

The scrap/debris generated from the above work is disposed of as per extant procedure.

Engineer in Charge
(Name, Sign & Stamp with date)

Contractor
(Name, Sign & Stamp with Date)

MDL Tender No. 1900000242 **Enclosure-29**

Declaration in respect of Conflict of Interest among Bidders/ Agents

We, hereby, declare that we do not have Conflict of Interest with other Bidders. We shall be disqualified if found having conflict of interest with other bidders.

We may be considered to have a conflict of interest with one or more parties in this bidding process, if:

a) *We have controlling partner(s) in common; or*
b) *We received or have received any direct or indirect subsidy/ financial stake from any of them; or*
c) *We have the same legal representative/agent for purpose of this bid; or*
d) *We have relationship with each other, directly or through common parties, that puts us in a position to have access to information about or influence on the bid of another Bidder; or*
e) *We participate in more than one bid in this bidding process. Participation by us in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid.*
f) *In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. We must proactively declare such sister/ common business/ management units in same/ similar line of business.*

SIGNATURE:_____ **DATE:**_____

Seal / Stamp of Bidder

MDL Tender No. 1900000242 **Enclosure-30**

PROFORMA OF UNCONDITIONAL AND IRREVOCABLE INSURANCE SURETY BOND FOR BID BOND / EMD

(On Non-Judicial stamp paper of value Rs. 500/-. However, the value of stamp paper to be confirmed from Legal Department, MDL.)

Ref. No. .....
Insurance Surety Bond No. .....
Dated: .....

1. IN CONSIDERATION OF MAZAGON DOCK SHIPBUILDERS LIMTED, a company incorporated under the Companies Act 1956 and having its registered office at Dockyard Road, Mumbai 400010 (hereinafter referred to as the "the Company" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) having agreed to accept the Earnest Money Deposit (EMD) of Rs----------(Rupees----------only) in the form of an unconditional and irrevocable Insurance Surety Bond (ISB) from Messers ..... a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at .....(hereinafter called " the tenderer" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) for participating in the Tender no.....dated..... (hereinafter called "the tender" which expression shall include any amendments/alterations to "the tender" issued by "the Company") for the supply, delivery at site, installation and commissioning of certain equipment, item/services/civil works etc., We, ... Surety Insurer having office at ..... (hereinafter referred to as "the Surety" which expression shall includes its successors and assigns) hereby agree to pay to the Company without any demur on first demand an amount not exceeding Rs..... (Rupees.....only) against any loss or damage, costs, charges and expenses caused to or suffered by the Company by reason of non-performance and non-fulfilment or for any breach on the part of the tenderer of any of the terms and conditions of the said tender.

2. We, ... the Surety further agree that the Company shall be sole judge whether the said tenderer has failed to perform or fulfil the said tender in terms thereof or committed breach of any terms and conditions of the tender the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Company on account thereof and we waive in the favour of the Company all the rights and defences to which we as sureties may be entitled to.

3. We, ... the Surety further agree that the amount demanded by the Company as such shall be final and binding on the Surety as to the Surety's liability to pay and the amount demanded and the Surety undertake to pay the Company the amount so demanded on first demand and without any demur notwithstanding any dispute raised by the tenderer or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this Bond being absolute and unconditional.

4. We, ... the Surety further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said tender/or to extend

time of performance by the tenderer from time to time or to postpone for any time to time any of the powers exercisable by the Company against the tenderer and to forbear to enforce any of the terms and conditions relating to the tender and we shall not be relieved from our liability by reason of any such variation or extension being granted to the tenderer or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the tenderer or by any such matter or things whatsoever which under the law relating to sureties would have the effect of relieving us.

5. We, ... the Surety further undertake not to revoke this Bond during its currency except with the previous consent of the Company in writing.

6. We, ... Surety also agree that the Surety's liability under this Bond shall not be affected by any change in the constitution of the tenderer or dissolution or winding up of the business of the tenderer.

7. Notwithstanding anything contained herein above:

(i) Our liability under this Bond shall not exceed Rs.....

(ii) This Surety Bond shall be valid upto and including .....; and

(iii) We are liable to pay the Bond amount or any part thereof under this Surety only and only if you serve upon us a written claim or demand on or before .....(validity + ---weeks from the date of expiry of this Bond).

8. This Bond shall be governed by Indian laws and the Courts at Mumbai, India shall have the exclusive jurisdiction.

IN WITNESS WHEREOF the Surety has executed this document on this.....
day of .....
For .....
(Signature of a person authorised
to sign on behalf of "the Surety")

MDL Tender No. 1900000242 **Enclosure-31**

PROFORMA OF UNCONDITIONAL AND IRREVOCABLE INSURANCE SURETY BOND FOR PERFORMANCE SECURITY

(ILLUSTRATIVE FORMAT)

(On Non-Judicial stamp paper of value Rs. 500/-. However, the value of stamp paper to be confirmed from Legal Department, MDL.)

1. IN CONSIDERATION OF MAZAGON DOCK SHIPBUILDERS LIMTED, a company incorporated under the Companies Act 1956 and having its registered office at Dockyard Road, Mumbai 400010 (hereinafter referred to as the "the Purchaser" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) having placed an order on Messers ..... a partnership firm/sole proprietor business/a company registered under the Companies Act, 1956 having its office at .....(hereinafter called " the Contractor/ Supplier" which expression shall, unless it be repugnant or contrary to the subject or context thereof, be deemed to mean and include its successors and assigns) vide order No..... dated..... (hereinafter called "the order" which expression shall include any amendments/alterations to "the order" issued by "the Purchaser") for the supply , delivery at site, installation and commissioning of certain equipment, item/services/civil works etc. as stated in the said Order and the Purchaser having agreed with the Contractor/Supplier to accept an unconditional and irrevocable Insurance Surety Bond in lieu of Performance Security payable under the said order for the fulfillment and performance of the said order, We, ... Surety Insurer having office at ..... (hereinafter referred to as "the Surety" which expression shall includes its successors and assigns) hereby agree to pay to the Purchaser without any demur on first demand an amount not exceeding Rs..... (Rupees.....only) being 5% (10% in case of Capital Procurement) of the order value against any loss or damage, costs, charges and expenses caused to or suffered by the Purchaser by reason of non performance and non-fulfillment or for any breach on the part of the Contractor / Supplier of any of the terms and conditions of the said order.

2. We, ...the Surety further agree that the Purchaser shall be sole judge whether the said Contractor/Supplier has failed to perform or fulfil the said order in terms thereof or committed breach of any terms and conditions of the order and the extent of loss, damage, cost, charges and expenses suffered or incurred or would be suffered or incurred by the Purchaser on account thereof and we waive in the favour of the Purchaser all the rights and defences to which we as surety may be entitled to.

3. We, ... the Surety further agree that the amount demanded by the Purchaser as such shall be final and binding on the Surety as to the Surety's liability to pay and the amount demanded and the Surety undertake to pay the Purchaser the amount so demanded on first demand and without any demur notwithstanding any dispute raised by the Contractor/Supplier or any suit or other legal proceedings including arbitration pending before any court, tribunal or arbitrator relating thereto, our liability under this Bond being absolute and unconditional.

4. We, ... the Surety further agree with the Purchaser that the Purchaser shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said order/or to extend

time of performance by the Supplier from time to time or to postpone for any time to time any of the powers exercisable by the Purchaser against the Contractor/ Supplier and to forbear to enforce any of the terms and conditions relating to the order and we shall not be relieved from our liability by reason of any such variation or extension being granted to the Contractor/ Supplier or for any forbearance, act or omission on the part of the Purchaser or any indulgence by the Purchaser to the Contractor/Supplier or by any such matter or things whatsoever which under the law relating to sureties would have the effect of relieving us.

5. We, ... the Surety further undertake not to revoke this Bond during its currency except with the previous consent of the Purchaser in writing.

6. We, ... the Surety also agree that the Surety's liability under this Bond shall not be affected by any change in the constitution of the Contractor / Supplier or dissolution or winding up of the business of the contractor/ supplier.

7. Notwithstanding anything contained herein above:

(i) Our liability under this Bond shall not exceed Rs.....

(ii) This Surety Bond shall be valid upto and including .....; and

(iii) We are liable to pay the Bond amount or any part thereof under this Surety Bond only and only if you serve upon us a written claim or demand on or before ……(validity + 4 weeks from the date of expiry of this Bond).

8. This Bond shall be governed by Indian laws and the Courts at Mumbai, India shall have the exclusive jurisdiction.

IN WITNESS WHEREOF the Surety has executed this document on this.....day of .....

For ..... Surety
(by its constituted attorney)
(Signature of a person authorised
to sign on behalf of "the Surety")