



## Bid Document/ बिड दस्तावेज़

Bid Details/बिड विवरण			
Bid End Date/Time/बिड बंद होने की तारीख/समय	28-06-2023 15:00:00		
Bid Opening Date/Time/बिड खुलने की तारीख/समय	28-06-2023 15:30:00		
Bid Offer Validity (From End Date)/बिड पेशकश वैधता (बंद होने की तारीख से)	60 (Days)		
Ministry/State Name/मंत्रालय/राज्य का नाम	Ministry Of Heavy Industries And Public Enterprises		
Department Name/विभाग का नाम	Department Of Heavy Industry		
Organisation Name/संगठन का नाम	N/a		
Office Name/कार्यालय का नाम	National Automotive Board		
Total Quantity/कुल मात्रा	7015		
ltem Category/मद केटेगरी	ITEM 1 , ITEM 2 , ITEM 3 , ITEM 4 , ITEM 5		
BOQ Title/बीओक्यू शीर्षक	SITC of Cable and allied work		
Minimum Average Annual Turnover of the bidder (For 3 Years)/बिडर का न्यूनतम औसत वार्षिक टर्नओवर (3 वर्षों का)	5 Lakh (s)		
Years of Past Experience Required for same/similar service/उर्न्ही/समान सेवाओं के लिए अपेक्षित विगत अनुभव के वर्ष	3 Year (s)		
MSE Exemption for Years Of Experience/अनुभव के वर्षों से एमएसई छ्ट्ट/ and Turnover/टर्नओवर के लिए एमएसई को छूट प्राप्त है	Yes		
Startup Exemption for Years Of Experience/अनुभव के वर्षों से स्टार्टअप छ्ट/ and Turnover/ टर्नओवर के लिए स्टार्टअप को छ्ट प्राप्त है	Yes		
Document required from seller/विक्रेता से मांगे गए दस्तावेज़	Experience Criteria,Bidder Turnover,Certificate (Requested in ATC) *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer		
Bid to RA enabled/बिड से रिवर्स नीलामी सक्रिय किया	No		
Type of Bid/बिड का प्रकार	Two Packet Bid		

Bid Details/बिड विवरण		
Primary product category	ITEM 1	
Time allowed for Technical Clarifications during technical evaluation/तकनीकी मूल्यांकन के दौरान तकनीकी स्पष्टीकरण हेतु अनुमत समय	2 Days	
Inspection Required (By Empanelled Inspection Authority / Agencies pre- registered with GeM)	No	
Estimated Bid Value/अनुमानित बिड मूल्य	700000	
Evaluation Method/मूल्यांकन पद्धति	Total value wise evaluation	
Financial Document Required/वित्तीय दस्तावेज की आवश्यकता है।	Yes	

#### EMD Detail/ईएमडी विवरण

Required/आवश्यकता	No

### ePBG Detail/ईपीबीजी विवरण

Advisory Bank/एडवाइजरी बैंक	ICICI
ePBG Percentage(%)/ईपीबीजी प्रतिशत (%)	5.00
Duration of ePBG required (Months)/ईपीबीजी की अपेक्षित अवधि (महीने).	14

(a). EMD & Performance security should be in favour of Beneficiary, wherever it is applicable./ईएमडी और संपादन जमानत राशि, जहां यह लागू होती है, लाभार्थी के पक्ष में होनी चाहिए।

#### Beneficiary/लाभार्थी :

#### NATRAX

National Automotive Test Tracks (NATRAX) Agra – Mumbai Highway(NH-3), Next to Pithampur Flyover (From Indore) (Near Pithampur) District :- Dhar State :- Madhya Pradesh , 454774 (National Automotive Test Tracks)

#### Splitting/विभाजन

Bid splitting not applied/बोली विभाजन लागू नहीं किया गया.

#### MII Purchase Preference/एमआईआई खरीद वरीयता

MII Purchase Preference/एमआईआई खरीद वरीयता Yes

#### MSE Purchase Preference/एमएसई खरीद वरीयता

MSE Purchase Preference/एमएसई खरीद वरीयता	
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1. If the bidder is a Micro or Small Enterprise as per latest definitions under MSME rules, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria" subject to meeting of quality and technical specifications. If the bidder is OEM of the offered products, it would be exempted from the "OEM Average Turnover" criteria also subject to meeting of quality and technical specifications. In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.

2. If the bidder is a Startup, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria" subject to their meeting of quality and technical specifications. If the bidder is OEM of the offered products, it would be exempted from the "OEM Average Turnover" criteria also subject to meeting of quality and technical specifications. In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer. 3. The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated above in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3-year-old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.

4. Experience Criteria: In respect of the filter applied for experience criteria, the Bidder or its OEM {themselves or through reseller(s)} should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company for number of Financial years as indicated above in the bid document before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the Financial year. In case of bunch bids, the category of primary product having highest value should meet this criterion.

5. Preference to Make In India products (For bids < 200 Crore):Preference shall be given to Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a Class 1 local supplier is denoted in the bid document. If the bidder wants to avail the Purchase preference, the bidder must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which no purchase preference shall be granted. In case the bid value is more than Rs 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020. Only Class-I and Class-II Local suppliers as per MII order dated 4.6.2020 will be eligible to bid. Non - Local suppliers as per MII order dated 04.06.2020 are not eligible to participate. However, eligible micro and small enterprises vill be allowed to participate .In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.

6. Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15% (Selected by Buyer)of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 25%(selected by Buyer) percentage of total QUANTITY.

7. Estimated Bid Value indicated above is being declared solely for the purpose of guidance on EMD amount and for determining the Eligibility Criteria related to Turn Over, Past Performance and Project / Past Experience etc. This has no relevance or bearing on the price to be quoted by the bidders and is also not going to have any impact on bid participation. Also this is not going to be used as a criteria in determining reasonableness of quoted prices which would be determined by the buyer based on its own assessment of reasonableness and based on competitive prices received in Bid / RA process.

(Minimum 50% and 20% Local Content required for qualifying as Class 1 and Class 2 Local Supplier respectively/क्रमशः श्रेणी 1 और श्रेणी 2 के स्थानीय आपूर्तिकर्ता के रूप में अर्हता प्राप्त करने के लिए आवश्यक)

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

### Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Anuj Kumar	454774,National Automotive Test Tracks (NATRAX) Agra – Mumbai Highway(NH-3), Next to Pithampur Flyover (From Indore) (Near Pithampur) District :- Dhar State :- Madhya Pradesh	3500	45

## ITEM 2

(Minimum 50% and 20% Local Content required for qualifying as Class 1 and Class 2 Local Supplier respectively/क्रमशः श्रेणी 1 और श्रेणी 2 के स्थानीय आपूर्तिकर्ता के रूप में अर्हता प्राप्त करने के लिए आवश्यक)

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1	Anuj Kumar	454774,National Automotive Test Tracks (NATRAX) Agra – Mumbai Highway(NH-3), Next to Pithampur Flyover (From Indore) (Near Pithampur) District :- Dhar State :- Madhya Pradesh	1	45

### ITEM 3

(Minimum 50% and 20% Local Content required for qualifying as Class 1 and Class 2 Local Supplier respectively/क्रमशः श्रेणी 1 और श्रेणी 2 के स्थानीय आपूर्तिकर्ता के रूप में अर्हता प्राप्त करने के लिए आवश्यक)

#### Technical Specifications/तकनीकी विशिष्टियाँ

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### Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Anuj Kumar	454774,National Automotive Test Tracks (NATRAX) Agra – Mumbai Highway(NH-3), Next to Pithampur Flyover (From Indore) (Near Pithampur) District :- Dhar State :- Madhya Pradesh	3500	45

#### **ITEM 4**

(Minimum 50% and 20% Local Content required for qualifying as Class 1 and Class 2 Local Supplier respectively/क्रमशः श्रेणी 1 और श्रेणी 2 के स्थानीय आपूर्तिकर्ता के रूप में अर्हता प्राप्त करने के लिए आवश्यक)

#### Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

#### Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Anuj Kumar	454774,National Automotive Test Tracks (NATRAX) Agra – Mumbai Highway(NH-3), Next to Pithampur Flyover (From Indore) (Near Pithampur) District :- Dhar State :- Madhya Pradesh	10	45

### ITEM 5

(Minimum 50% and 20% Local Content required for qualifying as Class 1 and Class 2 Local Supplier respectively/क्रमशः श्रेणी 1 और श्रेणी 2 के स्थानीय आपूर्तिकर्ता के रूप में अर्हता प्राप्त करने के लिए आवश्यक)

Technical Specifications/तकनीकी विशिष्टियाँ

Specification Document	View File
BOQ Detail Document	View File

Advisory-Please refer attached BOQ document for detailed consignee list and delivery period.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

S.No./क्र. सं.	Consignee Reporting/Officer/ परेषिती/रिपोर्टिंग अधिकारी	Address/पता	Quantity/मात्रा	Delivery Days/डिलीवरी के दिन
1	Anuj Kumar	454774,National Automotive Test Tracks (NATRAX) Agra – Mumbai Highway(NH-3), Next to Pithampur Flyover (From Indore) (Near Pithampur) District :- Dhar State :- Madhya Pradesh	4	45

## Buyer Added Bid Specific Terms and Conditions/क्रेता द्वारा जोड़ी गई बिड की विशेष शर्तें

#### 1. Generic

OPTION CLAUSE: The Purchaser reserves the right to increase or decrease the quantity to be ordered up to 25 percent of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered quantity by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

#### 2. Scope of Supply

Scope of supply (Bid price to include all cost components) : Supply Installation Testing Commissioning of Goods and Training of operators and providing Statutory Clearances required (if any)

#### 3. Service & Support

Availability of Service Centres: Bidder/OEM must have a Functional Service Centre in the State of each Consignee's Location in case of carry-in warranty. (Not applicable in case of goods having on-site warranty). If service center is not already there at the time of bidding, successful bidder / OEM shall have to establish one within 30 days of award of contract. Payment shall be released only after submission of documentary evidence of having Functional Service Centre.

#### 4. Service & Support

Dedicated /toll Free Telephone No. for Service Support : BIDDER/OEM must have Dedicated/toll Free Telephone No. for Service Support.

#### 5. Certificates

Bidder's offer is liable to be rejected if they don't upload any of the certificates / documents sought in the Bid document, ATC and Corrigendum if any.

#### 6. Buyer Added Bid Specific ATC

Buyer Added text based ATC clauses

OTHER TERMS AND CONDITIONS SHALL BE AS PER ATTACHED DOCUMENTS INCLUDING EVALUATION PARA METERS (Sr. 6 of Annexure -I, of attached documents, Minimum Eligibility Criteria).

## Disclaimer/अस्वीकरण

The additional terms and conditions have been incorporated by the Buyer after approval of the Competent

Authority in Buyer Organization, whereby Buyer organization is solely responsible for the impact of these clauses on the bidding process, its outcome, and consequences thereof including any eccentricity / restriction arising in the bidding process due to these ATCs and due to modification of technical specifications and / or terms and conditions governing the bid. Any clause(s) incorporated by the Buyer regarding following shall be treated as null and void and would not be considered as part of bid:-

- 1. Definition of Class I and Class II suppliers in the bid not in line with the extant Order / Office Memorandum issued by DPIIT in this regard.
- 2. Seeking EMD submission from bidder(s), including via Additional Terms & Conditions, in contravention to exemption provided to such sellers under GeM GTC.
- 3. Publishing Custom / BOQ bids for items for which regular GeM categories are available without any Category item bunched with it.
- 4. Creating BoQ bid for single item.
- 5. Mentioning specific Brand or Make or Model or Manufacturer or Dealer name.
- 6. Mandating submission of documents in physical form as a pre-requisite to qualify bidders.
- 7. Floating / creation of work contracts as Custom Bids in Services.
- 8. Seeking sample with bid or approval of samples during bid evaluation process.
- 9. Mandating foreign / international certifications even in case of existence of Indian Standards without specifying equivalent Indian Certification / standards.
- 10. Seeking experience from specific organization / department / institute only or from foreign / export experience.
- 11. Creating bid for items from irrelevant categories.
- 12. Incorporating any clause against the MSME policy and Preference to Make in India Policy.
- 13. Reference of conditions published on any external site or reference to external documents/clauses.
- 14. Asking for any Tender fee / Bid Participation fee / Auction fee in case of Bids / Forward Auction, as the case may be.

Further, if any seller has any objection/grievance against these additional clauses or otherwise on any aspect of this bid, they can raise their representation against the same by using the Representation window provided in the bid details field in Seller dashboard after logging in as a seller within 4 days of bid publication on GeM. Buyer is duty bound to reply to all such representations and would not be allowed to open bids if he fails to reply to such representations.

This Bid is also governed by the General Terms and Conditions/ यह बिड सामान्य शर्तों के अंतर्गत भी शासित है

In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, 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. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws./जेम की सामान्य शर्तों के खंड 26 के संदर्भ में भारत के साथ भूमि सीमा साझा करने वाले देश के बिडर से खरीद पर प्रतिबंध के संबंध में भारत के साथ भूमि सीमा साझा करने वाले देश के बिडर से खरीद पर प्रतिबंध के संबंध में भारत के साथ भूमि सीमा साझा करने वाले देश के लिए तभी पात्र होगा जब वह बिड देने वाला सक्षम प्राधिकारी के पास पंजीकृत हो।बिड में भाग लेते समय बिडर को इसका अनुपालन करना होगा और कोई भी गलत कामाप्त करने और कानून के अनुसार आगे की कानूनी कार्रवाई का आधार होगा।

#### ---Thank You/धन्यवाद---



## नेशनल ऑटोमोटिव टेस्ट ट्रैक्स

## NATIONAL AUTOMOTIVE TEST TRACKS

**Tender Document** 

For

नैट्रैक्स में केबल की आपूर्ति स्थापना परीक्षण और कमीशनिंग का कार्य/Supply

Installation testing & commissioning of electrical with laying & jointing

At

## NATRAX

## PITHAMPUR, DIST. DHAR (Madhya Pradesh)

Tender No. - NATRAX/PROC/C&I/23/----

National Automotive Test Tracks (NATRAX)/ नेशनल ऑटोमोटिव टेस्ट ट्रैक्स (नैट्रैक्स)

A unit of National Automotive Board (NAB)/ राष्ट्रीय मोटर वाहन बोर्ड (एनएबी) की एक इकार्ड

NH-52, Old Agra- Mumbai Highway/ NH-52, पुराना आगरा-मुंबई राजमार्ग, Next to Pithampur Flyover/ पीथमपुर फ्लाईओवर के आगे , Post Khandwa (Near Pithampur)/ पोस्ट खंडवा (पीथमपुर के पास)

Dhar District, Madhya Pradesh-454774/ धार जिला, मध्य प्रदेश -454774 Phone: +919893892310, Fax – 07292-256101 Email: <u>a.prabhakar@natrax.in</u>, <u>anuj.kumar@natrax.in</u>

1. General Instructions:



नेशनल ऑटोमोटिव टेस्ट ट्रैक्स (नैट्रैक्स) नेशनल ऑटोमोटिव बोर्ड (एनएबी) के तहत एक ऑटोमोटिव टेस्टिंग एंड सर्टिफिकेशन सेंटर है, जो भारी उद्योग मंत्रालय, भारत सरकार द्वारा गठित एक स्वायत्त निकाय है। नैट्रैक्स को लगभग 3000 एकड़ भूमि पर पीथमपुर, जिला धार, (मध्य प्रदेश, भारत) के पास, सभी प्रकार के ऑटोमोबाइल के व्यापक परीक्षण और मूल्यांकन के लिए स्थापित किया गया है।/National Automotive Test Tracks (NATRAX) is an Automotive Testing & Certification Centre under National Automotive Board (NAB) which is an autonomous body constituted by Ministry of Heavy Industries, Government of India. NATRAX has been set up on approx. 3000 acres of land for comprehensive testing and evaluation of all types of automobiles, near Pithampur, Dist. Dhar, (Madhya Pradesh, India).

नेशनल ऑटोमोटिव टेस्ट ट्रैक्स (नैट्रैक्स) ऐसे योग्य और अनुभवी बोलीदाताओं से पासवर्ड संरक्षित या सीलबंद कोटेशन / बोलियां, GEM के मध्ययम से आमंत्रित करता है, जो काम करने, निष्पादित करने और कार्यान्वित करने के लिए इस दस्तावेज़ में निर्दिष्ट पात्रता मानदंड को पूरा करते हैं।तथा निर्धारित शर्तों पर कार्य करने के इच्छुक हैं । कार्यों का संक्षिप्त विवरण और एनआईक्यू/निविदा की समय-सीमा नीचे दी गई तालिका में संक्षेप में दी गई है:/ The National Automotive Test Tracks (NATRAX), invites **Quotations/Bids** through GeM, from the qualified and experience Bidder(s) who meets the specified eligibility criteria in this document in the prescribed Proforma for performing, executing and implementing the works on the terms and conditions contained in this Bid document. Breif description of works and the timelines for NIQ/tender are summarised in the table below:

<b>कार्य का वर्णन</b> /Description of Work	<b>अनुबंध की अवधि</b> / Period of Contract	अनुमानित लागत / Estimated Cost
नैट्रैक्स में केबल की आपूर्ति स्थापना परीक्षण और कमीशनिंग का काम/ Supply Installation testing & commissioning of electrical cable laying & jointing at NATRAX	<b>45 day</b> from the date of Issue of Work Order.	Rs <u><b>7.0</b></u> Lakh

बोलीदाता (आईटीबी) के निर्देशों में उल्लिखित न्यूनतम पात्रता मानदंड (एमईसी) को पूरा करने वाले बोलीदाता बोली प्रक्रिया में सफलतापूर्वक बनने के पात्र हो सकते हैं। जेवी/कंसोर्टियम के रूप में बोली लगाने वालों को अनुमति नहीं है।/ The Bidder(s) who meet the Minimum Eligiblity Criteria (MEC) as mentioned in the Instructions to Bidder (ITB) may be eligible to become successfully in the Bidding process. <u>The bidder(s) in the form of JV/Consortium is not</u> <u>permitted.</u>

2. <u>कोटेशन/बोली प्रस्तुत करने का विवरण/ Quotations/Bid Submission</u> details: इच्छ्क बोलीदाता को केवल GeM पोर्टल के माध्यम से

## <u>कोटेशन/बोलियां जमा करनी होंगी।/ the intersted Bidder has to submit</u> the quotations/bids through GeM portal only.

टेलीग्राफिक रूप से या ट्रांसमिशन के अन्य माध्यमों (टेलीफैक्स, आदि) के माध्यम से भेजी गई बोलियां जो पासवर्ड से सुरक्षित नहीं हैं, उन्हें दोषपूर्ण, अमान्य माना जाएगा और खारिज कर दिया जाएगा।/ Bids sent telegraphically or through other means of transmission (telefax, etc.) which are not Password Protected shall be treated as defective, invalid and shall stands rejected.

नैट्रैक्स गैर-प्राप्ति/गैर-वितरण/या किसी तकनीकी त्रुटि या गलत प्राप्तकर्ता के कारण किसी भी देरी के लिए जिम्मेदार नहीं होगा। बोलीकर्ता नैट्रैक्स से अपनी बोली प्रस्तुत करने की प्राप्ति की पुष्टि कर सकते हैं /NATRAX shall not be responsible for any delays for non-receipt /non-delivery/or any technical errors or due to wrong addressee. Bidders may confirm the receipt of their Bids submission from NATRAX

### 3. Disclaimer/ अस्वीकरण:

कोई किसी सभी को नैटैक्स बिना कारण बताए या प्रस्तावौं स्वीकार/अस्वीकार/संशोधित/विभाजित करने के सभी अधिकार सुरक्षित रखता है। नैट्रैक्स के किसी भी निर्णय के लिए बोलीदाताओं के पास कार्रवाई का कोई कारण या दावा नहीं होगा।/ NATRAX reserves all rights to accept/ reject/modify/split any or all proposals without assigning any reasons. Bidders shall not have any cause of action or claim against NATRAX for any of its decisions.

### For NATRAX

### Head Procurement & Stores

इस निविदा में आगे चार अन्बंध शामिल हैं/ This tender further contain four Annexures

- A. अनुबंध-I (ए)-बोलीदाताओं के लिए निर्देश (आईटीबी)/ Annexure-I (A)-Instructions to Bidders (ITB)
- B. अनुबंध- I (बी) अनुबंध की विशेष शर्ते।/ Annexure-I (B)- Special conditions of contract.
- C. अनुबंध-II- अनुबंध/विनिर्देश/ड्राइंग और डिजाइन की तकनीकी शर्तें।/ Annexure-II- Technical Conditions of contract/Specification/Drawings & Design.

D. अन्बंध-III- कार्य का विस्तरत दायरा/ Annexure-III- Detailed scope of work.

#### A. ANNEXURE I (A)- INSTRUCTION TO BIDDERS (ITB)

a) The bidders are advised to submit the bid after duly signed submitted on each page, the bids received without sign and numbered may be rejected by NATRAX.

#### 1. Technical Bid Opening:

The Technical Bids are opened at the first instance and evaluated and at the second stage, financial Bids of only **technically qualified Bidder** shall be opened on **GEM portal only.** 

- 2. The Bidders are expected to meet the minimum eligibility criteria (MEC) as given in this document. NATRAX will disqualify the Bid(s) those do not meet the minimum eligibility criteria as laid down, based on their submission along with the Tender documents even after the Bid opening process is concluded.
- 3. The Contract shall be governed by the terms and conditions specified in this tender document including amendments, work order etc.,
- 4. All Bidders are hereby explicitly informed that "CONDITIONAL OFFERS" or "OFFERS WITH DEVIATIONS" from the conditions of Contract, the quotation not meeting the minimum eligibility criteria, technical specifications, or any other requirements as stipulated in the Tender documents are liable to be "REJECTED".
- 5. Bidders should give details of their technical soundness and provide list of customers/client of previous works of similar nature in Government Departments/ Undertakings/ Public / Private sectors/Autonomous etc.,
- 6. Minimum Eligibility Criteria: -

#### Documents to be submitted along with the Bid:

The Bidders who's Bid meet the following criteria would only be considered as responsive and evaluated by NATRAX.

### i. MEC 1: -

**Legal Valid Entity**: The Bidder shall necessary be a legal valid entity either in the form of Proprietary/Private Partnership/ Public Limited Company/ Private/ Govt./ Public/ Autonomous, documentary evidence should be submitted. **In form of JV/Consortium not permitted.** 

Following List of acceptable documents should also be submitted along with under above-

- a) Certificate of Incorporation/Commercial establishment of firm/License certificate of the firm, etc.
- b) PAN Card/GST registration, PF registration, ESI Registration, Labor License and any other applicable statutory requirements, etc.,

**ii. MEC - 2: Financial Capabilities:** The Bidder should have minimum 3 years' experience with Minimum **Average Annual Financial** turnover during the last three years, ending on 31st March of the previous financial year (2020-21, 2021-22 & 2022-23), should be as **Rs 5 Lakh**. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods OR a Certificate (with UDIN NO.) from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be submitted with the Bid.

In case the date of constitution / incorporation of the Bidder are less than3-year-old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criterion. For startups registered firms, no turnover is required.

#### Any of the following acceptable documents to be submitted with Bid:

- a) Certified balance sheets for relevant period mentioned above, must necessarily have UDIN.
- b) Certificate from charted accountant / cost accountant indicating turnover details for relevant period mentioned above, must necessarily have UDIN.

**iii. MEC-3** –**Similar works:** The Bidder should have successfully completed **similar works**\* component in the last 7 years meeting the following criteria: -

- a. Three similar completed works costing not less than the amount equal to 40 (forty) percent of the estimated cost; or
- b. Two similar completed works costing not less than the amount equal to 50 (fifty) percent of the estimated cost; or
- c. One similar completed work costing not less than the amount equal to 80 (eighty) percent of the estimated cost;

Similar Works\*: successfully completed work pertaining to SITC of cable /electrical cable etc., for any Govt Dept.,/Reputed firm Private Institution/Academic Institutions/etc.

### List of accepted documents as proof of MEC (iii) above:

a) Completion certificate along with PO/ work order, with value of works, etc.,

- b) Incase completion certificate/Purchase order (PO) does not clearly mention the value of work executed, then the Bidder shall submit the fresh summary & proof as TDS, CA certificate, Excise, GST returns etc.,
- c) Incase PO/Work order/completion certificate issued by any private employer, than form 26AS should be submitted to support the genuineness of the same.

### 7. Tender Fee & Exemptions: -

- a) This tender is free of cost.
- b) If registered under Startups and "Micro & Medium Small Enterprises" (MSME's), supporting documents need to be submitted to avail exemption from Earnest Money, subject to verification of certificate.
- c) The Benefits & Exemptions for Startups and MSME Bidders (Udhyam Registration Certificate) - the exemption from prior turnover & experience & price benefit (under Class 1, 2 & 3) may be given as per the guideline.
- 8. The Bidders are expected to carefully examine all the contents of the Tender documents/NIQ including instructions, conditions, terms, specifications, drawings (if any), shall inspect the Site with prior notice to NATRAX and at Bidders own cost, acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto & take them fully into account before submitting their offer. Failure to comply with the requirements as detailed in these documents shall be at the Bidder's own risk. Bids which are not responsive to the requirements of the Tender will be rejected.
- 9. While all efforts have been made to avoid errors in drafting of the Tender documents, the Bidder is advised to check the same carefully. No claim on account of any errors detected in the Tender documents shall be entertained.
- 10. The Bidder shall carry out all the work strictly in accordance with Specification, Standard Practices and instructions of NATRAX or NATRAX's representative and deviation on any account will not be permitted. If in the opinion of NATRAX, changes have to be made and it desires the Bidder to carry out the same. The decision of NATRAX in such cases shall be final and shall not be open to arbitration.
- 11. The successful Bidder is bound to carry out associated work necessary for the completion of the job even though such items are not included in the quantities to achieve end results and deemed to be priced in the other items. No claim on this account shall be entertained.
- 12. Addendum / Corrigendum (if required) to the Tender may be issued prior to the date of opening of the Bid to clarify or to intimate any changes/modifications etc. All such addendum / corrigendum shall be treated as an integral part of the Tender.

- 13. Any effort by a Bidder to influence NATRAX or any of its functionaries in the process of examination, clarification, evaluation and comparison of tenders and in decisions concerning award of contract, may result in rejection of the Bid.
- 14. In order to afford prospective bidders, reasonable time for preparing their Quotes after taking into account such amendments, NATRAX may, at its discretion, extend the deadline for submission of Bids.
- 15. Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations concerning the award of Contract shall not be disclosed to Bidders or other persons not officially concerned with such process.
- 16. NATRAX reserves the right to accept / reject or modify any Bids, and to annul the Tender process and reject all Bid(s)/quotation(s), at any time prior to award of Contract, or to divide the Contract between/amongst Bidders without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the grounds for NATRAX's action. Any Bidder not following ITB stands rejected.

### **17. TECHNICAL BID EVALUATION**

- a) **NATRAX** shall follow the **Segregated Bid evaluation** system (No bearing of technical score in the financial Bid evaluation and L-1 in the financial Bid shall be deemed as successful Bidder) to determine the successful Bidder.
- b) The Bidder must qualify the all three MEC's.
- c) The Bidder is requested to specify what particular value he is offering for each particular requirement, rather than just stating he is fulfilling the Mínimum Requirement.
- d) During the technical Bid evaluation process, NATRAX may ask clarifications to the Bidder through E-mail for confirming and consolidating their technical offers.
- e) All such clarifications are required to be answered by the bidders by E-mail/GEM, within the time specified by NATRAX.
- f) The Financial Bids of the Technically qualified Bidders shall be opened on GEM PORTAL only.

### 18. FINANCIAL BID EVALUATION:

- a) For the evaluation of the Financial Bids, the eventual Bid prices shall be ascertained after considering all the terms and conditions associated with the Bid price specified in the Financial Bid document and after detailed scrutiny of the financial bid.
- b) No Bidder shall be allowed to propose/carry out any revision / correction / modification in his Price Bid offer.
- c) If there is a discrepancy between the sub total/s and the total price that is obtained by multiplying the unit price and quantity/adding the sub total/s, the sub total/s shall prevail and the total price shall be corrected, unless in the opinion of the Employer that there is an obvious misplacement of the decimal point in the sub total price, in which case the total price as quoted shall govern and the sub total/s shall be corrected;
- d) If there is an error in a total, corresponding to the addition or subtraction of sub totals, the subtotal/s shall prevail and the total shall be corrected; and
- e) The Bidder needs to fill the rates against each item in word as well as in figures as mentioned in BOQ (Financial Bid). In case of any discrepancy, the rate provided in word shall prevail and correct the amount against the item. All the prices should be inclusive of all taxes and GST.
- f) The amount stated in the Letter to Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the Bidder does not accept the corrected amount of Bid, the bid will be rejected.
- g) Contract negotiations, if any, will be held before the issuance of Letter of Acceptance/ Notification of Award. The negotiation shall conclude with a revised offer letter from the successful bidder, affecting the discounts if any and accepted by NATRAX.

### **19.** Award of Work:

- a) Prior to the expiry of the period of Bid validity prescribed, NATRAX will issue to the Successful Bidder, the Work Order. The Successful Bidder shall return one copy of the Work Order to NATRAX duly acknowledged and signed by the authorized signatory, within two [2] days of receipt of the same by him.
- b) NATRAX shall notify all the unsuccessful Bidders and discharge/ return their Earnest Money Deposit. No correspondence will be entertained by NATRAX from the unsuccessful Bidders.

### 20. Validity of bids:

The rate quoted should be valid for **a minimum period of 90 days** from the last date of Submission of Quotation. No claim for escalation of rate will be considered at any point of time.

- 21. Prospective bidders requiring any clarification of the Tender may write to <u>a.prabhakar@natrip.in; anuj.kumar@natrip.in</u>,
- 22. The Bids / related correspondences shall be made in English language.

#### Annexure-I (B)

#### 23. Special Conditions of contract:

a.	Scope of work	Supply Installation testing & commissioning of electrical cable with laying & jointing at NATRAX.	
b.	Contract Period	45 days from the date of Issue of Work Order.	
c.	Engineer Incharge (EIC)	Shall be notified to successful bidder.	
d.	Rate Firmness	The charges/rate quoted by supplier must be firm throughout the Contract period and no escalation of any kind is permissible. The "final contract value" shall be derived on the completion of work at actual.	
e.	Defect Liability Period	12 month from the date of completion of work	
	Payment, Mode and Retention	<ul> <li>i. Payment shall be made on the submission of IPC along with supporting document and certified by EIC.</li> <li>ii. 10% retention shall be deducted from each IPC, restricted to 5% of contract value and shall be paid after successful completion of Defect Liability Periods.</li> <li>iii. Final Payment shall be made after successful completion of work and issuance of completion certificate along with supporting document and certified by EIC.</li> <li>iv. Payment shall be made after statutory deduction as applicable.</li> <li>v. The IPC payment shall be released within 15 working days from the date of certification by EIC. In case of final payment, it shall be made within 30 days after issue of completion certificate.</li> </ul>	

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		vi. Material advance shall be provided @ 70% of invoice value after delivery and submission of GST invoices to the EIC within 15 days and the same shall be recovered from subsequent IPC.
		vii. Advance payment: maximum 10% of contract value may be paid after receiving request from contractor and submission of bank guarantee of 110% of the requisite amount. An interest 10% per annum shall be charged on the outstanding advance payment. The said advance payment shall be released in minimum two instalments. Contractor has to submit a utilization certificate for the said advance payment.
		viii. The GST/Taxes & duties of Govt. will be reimbursed on actual basis upon the submission of original receipt/documentary evidence.
		All the payments shall be made through RTGS only.
	Quantity Variations / Revision of Rates	NATRAX shall, having regard to the Scope of Works and the approved Contract Price, shall have power to order variations within the Scope of the Works as considers necessary or avoidable during the progress of the Works. Such variations shall form part of the Contract and the Contractor shall carry them out and include them in updated Programmes produced by the Contractor. Oral orders for Variations, unless followed by written confirmation, shall not be taken into account. There will not be any revision in rates for all the items provided in BOQ for any extent of variations, during the entire currency of the contract.
		or New Rate or Price for NON BOQ items shall be finalized by the NATRAX representative based latest Applicable DSR or MPSoR.
h.	Liquidated Damages	0.01% of the Contract Price per day to a maximum of 10% of the Contract Price.
i.	Project Facility / Place of Installation/deliv ery	NATRAX Site NH-52, Old Agra- Mumbai Highway, Near to Pithampur Flyover, Post Khandwa (Near Pithampur), Dhar District, Madhya Pradesh-454774
j.	Bid Security/EMD	Not applicable



k.	Performance Security	5% (Five) of the Contract value should be submitted as Performance Security by the Successful Bidder on award of Contract. Performance Security may be furnished in the form of an A/C Payee Demand Draft, Fixed Deposit Receipt or Bank Guarantee from a Scheduled Commercial Bank favoring " <b>National Automotive Test Tracks</b> " & payable at <b>Pithampur</b> and should remain valid for a period of Sixty days beyond the date of completion of all Contractual Obligations.
1.	ReturningofPerformanceSecurity (PBG)	The performance security shall be returned after 15 Days of completion of Defect Rectification/Warranty Period.
m.	Returning of Retention Money	The retention money shall be released after 15 days of completion of Defect Rectification/Warranty Period, OR may be released on submission of PBG of same value.
n.	Other Terms and conditions	<ul> <li>i. The bidder should submit list of the equipments/machines with them. In case machines/equipments are planned to hire from others the rent agreement for hiring the same should be submitted.</li> <li>ii. No extra charge is payable for to and fro, boarding and lodging for the service personnel coming to NATRAX.</li> </ul>
о.	Water supply & Electricity Charges	<ul> <li>i. Electricity: the electricity shall be provided by NATRAX from the available source. Theft of electricity shall be treated as breach of contract and in such case NATRAX reserve the right for penalty or termination of contract.</li> <li>ii. Water supply: the water for drinking purpose can be use from the available source at site, misuse/wastage apart from the above use, of water shall be treated as breach of contract and in such case NATRAX reserve the right for penalty or termination of contract.</li> </ul>
p.	Termination of Contract	If the work/service is found to be not satisfactory or not found as per the specification indicated in this document, the Contract will be terminated with short notice of 14 days in writing. In case of termination the balance work shall be completed by NATRAX through any other party on the risk & cost of contractor.

24. The bidder should give the following, duly signed and sealed, failing to which the bids will be summarily rejected:

#### **25. DECLARATION:**

#### (To be executed on Bidder's letter head)

I / We hereby declare that the firm/company has not been blacklisted or debarred in the past by any other Government organization from taking part in Government tenders.

In case the above information found false or in case of breach of any of terms and conditions at any stage of Tender or Contract, I/We are fully aware that the Tender/ Contract will be rejected / cancelled by NATRAX and Payments (for completed/partially completed), Retention, Bid Security (EMD), Performance Security, etc., shall be forfeited.

Signature of the Bidder:	
Name and Designation:	
Address:	
Contact details:	
Place:	
Date:	Seal of the Bidder's Firm

ANNEXURE - II

### TECHNICAL CONDITIONS OF CONTRACT/ SPECIFIATION/DRAWINGS/DESIGN



**TECHNICAL SPECIFICATIONS** 

## TECHNICAL SPECIFICATION OF ELECTRICAL WORKS

**Table of Contents** 



S. No	Description
1	Technical Specifications – General
2	Technical Specifications- Cable laying
3	LT- Cables 1.1 KV
4	Specific condition, list of vendors, quality assurance plan for electrical work

#### 1. GENERAL

- 1.1. These specifications indicate the General requirements for electrical work including wiring system, panel boards, cable laying, earthling protection and other related works.
- 1.2. These specifications are drawn to indicate essential requirements and precautions to be taken regarding internal electrical installation for ensuring efficient, safe, economical and practicable use of electrical materials and equipment, in conformity with statutory regulations and easy maintainability of the installations.
- 1.3. Complete work shall be carried out conforming to the provisions of Indian Electricity Act and relevant Indian standard Specifications (ISS). Wherever these regulations are supplemented by the State Electricity Dept., Electricity Undertakings/Boards, Factory inspector and the Safety Engineering Dept. of AI, the installation shall also comply with these requirements. Wherever the specifications given in this booklet differs from those of the statutory regulations, these specifications shall be followed.
- 1.4. On completion of works, wiring diagram for complete installation shall be prepared by the contractor and 4 copies of the same shall be supplied to AI.
- 1.5. All wiring diagrams shall indicate clearly in plan the main switch board, distribution fuse board, the runs of various mains and sub mains and the position of points with their classifications and controls. All circuits shall be indicated and numbered in wiring diagram and all points shall be given the same number as the circuit to switch they are electrically connected. Distributions boards shall also be marked to indicate the circuit number controlled by them.
- 1.6. Prior to laying and fixing of conduits, the contractor shall carefully examine the working drawings prepared by him and approved by the Owner indicating the layout, satisfy himself about the sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor shall be gotten approved before the actual

laying of conduits is commenced. In laying of conduits it is important that not more than two right angle bends are provided for each circuit and as far as possible. No junction box shall be provided in the entire length of conduit run for drawing of wires. Only switch outlets, lighting fixture outlets, equipment power outlets and socket outlets shall be considered for drawing of wires.

- 1.7. The Contractor shall prepare fabrication and detailed working drawings and obtain approval of EIC before submitting them for approval . All works shall be carried out only on approval of drawings. Approval of drawings, does not relieve the contractor of his responsibilities to meet the intents of specifications.
- 1.8. Location of panel boards, distribution boards, switch boards, light fittings, cable routes, conduit/ CTS wiring routes, earth pits etc. shall be marked at site and approval of Engineer-in-charge obtained before proceeding with the installation work.
- 1.9. Rated Power, Voltage and frequency of supply of current consuming devices and materials used in installation shall be suitable for the power and frequency of the supply to which these are to be connected.
- 1.10. Materials of these brand names only shall be utilized for this work.
- 1.11. 1.11 STANDARDS:

For all materials and equipments Indian standard Specifications shall apply. In the absence of ISS, relevant British Standards shall be applicable. All Specifications, publications mean the latest edition. A list of IS Specifications applicable for electrical works is given as under .

## LIST OF INDIAN STANDARDS (IS)

Latest edition of following standards shall be refered

IS : 374	Ceiling fans and regulators (3rd revision)
IS : 694	PVC insulated Electric cable for working voltage upto and including 1100 volts.
IS : 732	Code of practice for electrical wiring and installation
IS : 1255	Code of Practice for installation and maintenance of Power Cables upto and including 33 KV rating (Second Revision).
IS : 1258	Bayonet lamp holders(Third revision)
IS : 1293	Three pin plugs and sockets outlets rated voltage upto and including 250 volts and rated current upto and including 160 amps.
IS : 1554 (Part - I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts.
IS : 1646	Electrical installation fire safety of buildings (general) Code of practice.
IS : 1885	Glossary of items for electrical cables and conductors



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IS : 1913	General and safety requirements for fluorescent lamps luminaries Tubular.
IS : 2071	Methods of high voltage testing
IS : 2309	Protection of building and allied structures against lightning
IS : 2551-	Danger notice plate.
IS : 3043	Code of practice for earthing.
IS : 3427	AC Metal enclosed switch gear and control gear for rated voltages above 1 KV and upto and including 52 KV.
IS : 3480	Flexible steel conduits for electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 4146	Application guide for voltage transformers
IS : 4615	Switch socket outlets.
IS : 5133 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216	Guide for safety procedures and practices in electrical work.
(Part-I)	······································
IS : 5424	Rubber mats for electrical purposes.
IS:5578& 11353	Marking and arrangement of bus bars
IS : 7098	Cross linked polyethylene insulated PVC sheathed cables. For
(Part - II)	working voltages from 3.3 KV upto and including 33 KV
IS : 8130	Conductors for insulated electric cables and flexible cords
IS : 8623	Factory built assemblies of switchgear and control gear for voltages
(Part -I)	upto and including 1000 V AC and 1200 V D C.
IS : 8828	Miniature Circuit Breakers
IS : 9537	Rigid Steel Conduits for electrical wiring (Second Revisions)
IS : 10810	Methods of test for cables.
IS : 12640	Earth Leakage Circuit Breakers
IS : 13947	Degree of protection provided by enclosures for LV switchgear and control gear.



IS : 13947	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.
IS : 15652	Insulating mats for electrical purposes.
IS: 1651 & 1652	Stationary cells and batteries lead acid type.

#### 2. CABLE LAYING

- 2.1. All cable shall be PVC insulated, sheathed end steel armored with an outer PVC protective sheath. Cables shall have high conductivity stranded aluminum conductors and cores shall be color coded as per Indian Standards.
- 2.2. All cables shall be without any kinks or visible damage.
- 2.3. Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the basis of actual site measurements.
- 2.4. Cable laid directly in ground shall be at a depth of 60 cms for (LT Cables) and laid on a bedding of sifted earth. After the cables are laid over the bedding, for the entire length of cable.suitable markings shall be placed above the cables. Road crossings and concreted areas shall be negotiated through buried C.I. / RCC pipes. Cable shall be bent to a radius of not less than 8 diameters, leaving sufficient slack for soil subsidence and loops at both ends. Loops shall be provided at both ends of the cable and near straight through joints as directed by the Engineer-in-Charge. Wherever more than one cable is buried in one trench, non-corroding identification tags shall be provided on each cable at 10 M intervals. In addition suitable galvanized cable markers shall be provided above ground over behinds, loops crossings at every 30 M interval on straight runs.
- 2.5. Cables shall have twin continuous aluminum/G.I. conductors as specified against each item along the entire length of cable for continuous earthing. Cables shall be earthed at both ends.
- 2.6. All cables shall be properly terminated with glands, tinned copper lugs and cables identification tags and shall be properly crimped or soldered with lugs as directed.
- 2.7. All the indoor cables shall be laid on walls, ceilings, inside shafts, with suitable supports. Distance between supports shall not be more than 50 cms.
- 2.8. Cables shall be laid indoors by using 3 mm thick M.S. spacers with G.I. saddles and screws.
- 2.9. Cables laid directly in existing trenches shall be properly supported by M.S. Clamps.
- 2.10. Straight through joints shall not be permitted where the route length does not exceed one full drum length. In case of routes where the length exceeds on full drum length, minimum number of straight through joints as approved by the Engineer-in-charge shall be provided. However, no separate payment will be made for such straight through joints.
- 2.11. Cables shall be tested before laying and after laying but definitely before connecting up to the switch gears.

- 2.12. After the cable installation is complete, the entire installation shall be tested with 500 V insulation resistance tester and following reading established.
  - (i) Continuity on all phases
  - (ii) Insulation resistances between conductors, conductors and ground. All test readings shall be recorded and handed over to Engineer-in-Charge.
- 2.13. In case of High Tension cables the insulation test shall be carried out using 2000 V meggar. In addition to this pressure test shall be carried out on the H.R. Cables as specified in IS:1255 Code of Practice for installation & maintenance of paper insulated power cables.

#### 2.14. Mode of Measurements :

- 2.14.1. All cabling shall be measured on the basis of unit length and the cost per unit length shall include cost of cable, cost of supports, clamps, labour for installations, testing & commissioning all complete.
- 2.14.2. In the case of cables laid in ground/duct, excavation sand cushioning, brick covering & back filling shall also form part of the cabling.
- 2.14.3. While all cable supporting clamps are to be included in the unit cost of cables, cable trays or cable racks wherever specifically indicated shall be paid extra on unit rates.
- 2.14.4. Cable terminations shall be measured per set and the cost shall include cost of tinned copper lugs, brass glands, all jointing materials, bolts and nuts, M.S. plate support labour and any other incidental items not specifically indicated above.

#### 3. 1.1 KV GRADE XLPE / PVC CABLES

#### 3.1. General

The cables shall be supplied, inspected, laid, tested and commissioned in accordance with drawings, Specifications, relevant Standard Specifications and cable manufacturer's instruction.

#### 3.2. Material

The cables shall be FRLS, cross linked polyethylene (XLPE) insulated PVC inner sheathed, of armored 1100 volts grade with high conductivity stranded conductors and cores as specified in the schedule of quantities.

3.2.1. Specifications of PVC insulated copper cable shall be as follows:

#### a. Conductor

Stranded compacted circular conductor shall be of electrical grade high conductivity copper below 25 sq.mm as per IS 8130 / 84

b. Insulation

The insulation shall be XLPE/PVC, application shall be by extrusion process insulation confirming to IS 5831-1984. The thickness of insulation will be as per the relevant codes.

#### c. Laying-up

Insulated conductors of multi core cables shall be with thermoplastic fillers in the interstices. The phase identification of cores shall be by colored strips.

d. Inner Sheath

Cores shall be surrounded either by a wrapped or an extruded PVC sheath.

The thickness of the inner – sheath shall be as per relevant codes.

e. <u>Armoring</u>

The armoring shall be provided over the inner sheath.

Single core cable shall have dia -magnetic armoring. Multi core cables shall have either galvanized round steel wires or flat steel strip armoring. Steel wires and strips for armoring confirm to IS:3975. The direction of lay of armoring shall be opposite to that of cores.

f. Outer Sheath

Single and multi core cables are provided with an extruded grade PVC outer-sheath. The thickness of the sheath shall be as per IS:1554-1988. The PVC compound for the outer-sheath shall confirm to Type ST1 of IS 5831. The color of the outer sheath shall be black with marking at every meter.

- 3.2.2. Specifications for XLPE aluminum / copper cable shall be as follows:
- a. Conductor

Stranded compacted circular conductor shall be of electrical grade high conductivity aluminum per IS 8130/84

b. Insulation

The insulation shall be of natural unfilled chemically cross linked polyethylene conforming to IS 7098. The thickness of insulation shall be as per the relevant codes.

c. <u>Laying-up</u>

Insulated conductors of multi core cables shall be with plastic fiber in the interstices. The phase identification of cores shall be by colored strips.

d. Inner Sheath

The cores shall be surrounded by either a wrapped or by an extruded PVC sheath.

The thickness of the inner sheath shall be as indicated in the relevant codes.

e. <u>Armoring</u>

The armoring shall be provided over the inner sheath.

Single core cable shall have non-magnetic armoring. Multi core cables shall have either galvanized round steel wires or flat steel strip. Steel wires and strips for armoring confirm to IS:3975. The direction of lay of armoring shall be opposite to that of cores.

f. Outer Sheath

Tender Document

Single and multi core cables are provided with an extruded FRLS grade PVC outer-sheath. The thickness of the sheath shall be as per IS:1554-1988. The PVC compound for the outer-sheath shall confirm to Type ST2 of IS 5831. The color of the outer sheath shall be black with marking at every meter.

- 3.2.3. Current ratings of the cables shall be as per IS : 3961. The Conductor shall be stranded Aluminum/Copper circular/ sector shaped and compacted. In multi core cables the core shall be identified by red, yellow, blue and black coloring of insulation. Repaired cables shall not be used.
- 3.2.4. The cables shall be suitable for laying in racks, ducts, trenches, conduits and underground buried installation with uncontrolled back fill and chances of flooding by water.
- 3.2.5. Progressive automatic in line sequential marking of the length of cables in meters at every one meter shall be provided on the outer sheath of all cables.
- 3.2.6. Cables shall be supplied in non returnable wooden drums as per IS : 10418. Both ends of the cables shall be properly sealed with PVC/Rubber caps so as to eliminate ingress of water during transportation, storage and erection.
- 3.2.7. The product should be coded as per IS :- 7098 Part-I as follows :-

Aluminum Conductor	А	
XLPE Insulation		2X
Steel round wire armor		W
Steel strip armor		F
Steel Double round wire armor		WW
Steel Double strip armor		FF
Non-magnetic (Al.) round wire armor		Wa
Non-magnetic (Al.) strip armor		Fa
PVC outer sheath		Y

#### 6.3 Inspection

All cables shall be inspected by the contractor upon receipt at site and checked for any damage during transit.

### 6.4 Joints in Cables

The Contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoid cable jointing. This apportioning shall be got approved by the Owner's site representative before the cables are cut to lengths. Where joints are unavoidable heat shrinkable type joints shall be made. The location of such joints shall be got approved from the Owner's site representative and shall be identified through a marker.

### 6.5 Jointing Boxes for Cables

Cable joint boxes shall be installed with heat shrinkable sleeve and of appropriate size, suitable for XLPE armored cables of particular voltage rating.

#### 6.6 Jointing of Cables

All cable joints shall be made in suitable, approved cable joint boxes and the filling in of compound shall be done in accordance with manufactures' instructions and in an approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resin.

All cables shall be joined color to color and tested for continuity and insulation resistance before jointing commence. The seals of cables must not be removed until preparations for jointing are completed. Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged. The conductors shall be efficiently insulated with high voltage insulating tape and by using of spreaders of approved size and pattern. The joints shall be completely topped up with epoxy compound so as to ensure that the box is properly filled.

#### 6.7 Cable End Terminations

Cable end termination shall be done in cable terminal box using crimping sockets and proper size of glands of double compression type

#### 6.8 Bonding of Cables

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armor clamp and gland. The clamps must grip the armoring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors.

## 6.9 Cable Installation

Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the basis of actual site measurements.

Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize

stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable.

Great care shall be exercised in laying cables to avoid forming kinks.

All cables shall be properly terminated with glands, tinned copper lugs and cables identification tags and shall be properly crimped or soldered with lugs as directed.

All the indoor cables shall be laid on walls, ceilings, inside shafts, with suitable supports. Distance between supports shall not be more than 50 cms.

Cables shall be laid indoors by using 3 mm thick M.S. spacers with G.I. saddles and screws.

6.9.1 Laying of Cables on Cable Trays

The relative position of the cables, laid on the cable tray shall be preserved and the cables shall

not cross each other. At all changes in direction in horizontal and vertical planes, the cable shall be

bent smooth with a radius as recommended by the manufacturers. All cables shall be laid with

minimum one diameter gap and shall be clamped at every meter to the cable tray. Cables shall be

tagged for identification with aluminum tag and clamped properly at every 20M. Tags shall be

provided at both ends and all changes in directions both sides of wall and floor crossings. All cable

shall be identified by embossing on the tag the size of the cable, place of origin and termination.

All cables passing through holes in floor or walls shall be sealed with fire retardant Sealant and shall be painted with fire retardant paint up to one meter on all joints, terminations and both sides of the wall crossings

#### 6.9.2 Laying of Cables in Ground

The width of trench for laying single cable shall be minimum 450 mm and depth of 600mm. Where more than one cable is to be laid in horizontal formation, the width of the trench shall be workout by providing 200 mm gap between the cables, except where otherwise specified. There shall be clearance of 150 mm between the end cable and the side wall of the trench. The minimum depth of the cable trench shall not be less than 750 mm for single layer of cables. When the cables are laid in more than one tier the depth of the trench shall be increased by 300 mm for each additional tier.

Excavation of trenches: The trenches shall be excavated in reasonably straight lines. Wherever there is a change in direction, suitable curvature shall be provided. Where gradients and changes in depth are unavoidable, these shall be gradual. The excavated soil shall be stacked firmly by the side of the trench such that it may not fall back into the trench. The bottom of the trench shall be leveled and shall be made free from stone, brick bats etc. The trench shall then be provided with a layer of clean, dry sand cushion of not less than 100 mm in depth. Prior to laying of cables, the cores shall be tested for continuity and insulation resistance. The cable drum shall be properly mounted on jacks, at a suitable location, making sure that the spindle, jack etc. are strong enough to carry the weight of the drum and the spindle is horizontal. Cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains. The entire drum length shall be laid in one stretch. However, where this is not possible the remainder of the cable shall be removed by Flaking' i.e. by making one long loop in the reverse direction. After the cable has been uncoiled and laid into the trench over the rollers, the cable shall be lifted off the rollers beginning from one end by helpers standing about 10 meters apart and laid in a reasonably straight line. Cable laid in trenches in a single tier formation shall have a cover of clean, dry sand of not less than 150 mm. above the base cushion of sand before the protective cover is laid. In the case of vertical multi-tier formation after the first cable has been laid, a sand cushion of 300 mm shall be provided over the initial bed before the second tier is laid. Finally the cables shall be protected by second class, well burnt old size bricks/ Precast Concrete Cable cover as per IS: 5820 with average breaking capacity 300kg before back filling the trench. The buried depth of uppermost layer of cable shall not be less than 750mm.

Back Filling : The trenches shall be back filled with excavated earth free from stones or other sharp edged debris and shall be rammed and watered, if necessary, in successive layers not exceeding 300 mm. Unless otherwise specified, a crown of earth not less than 50 mm in the centre and tapering towards the sides of the trench shall be left to allow for subsidence.

# 6.10 Cables inside Building

Cables inside buildings shall be laid on the cable trays. All cables passing through walls shall run through GI Pipes sleeves of adequate diameter 50 mm apart maintaining the relative position over the entire length.

# 6.14 Testing of Cables

Cables shall be tested at works for all routine tests as per IS including the following tests before being dispatched to site by the project team.

Insulation Resistance Test.

Continuity test.

Sheathing continuity test

Earth test.(in armored cables)

Hi Pot Test.

Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Owner's site representative.

Insulation Resistance Test( Sectional and overall)

- b) Continuity test.
- c) Sheathing continuity test
- d) Earth test.

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Owner's site representative, results will be noted and signed by all present and record be maintained.

### 7.14 TEMPERATURE - RISE LIMIT

Unless otherwise specified, in the case of external surface of enclosures of bus bar trunking system which shall be accessible but do not need to be touched during normal operation, an increase in the temperature rise limits of 25° C above ambient temperature shall be permissible for metal surface and of 15° C above ambient temperature for insulating surfaces as per IS 8623(Part-2) 1997.

All panels shall be provided with ACB/MCCB/MPCB of appropriate capacity as per Single Line Diagram. All wiring for shall be concealed behind 5 mm thick Bakelite sheet or M S sheet cover. All Distribution boards shall be completely factory wired, ready for connection. All the terminals shall be of proper current rating and sized to suit individual feeder requirements. Each circuit shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and circuits shall be distinctly marked with a small description of the service installed.

Continuous earth bus sized for prospective fault current shall be provided with arrangement for connecting to station earth at two points. Hinged doors/ frames shall be connected to earth through adequately sized flexible braids.

#### 7.15 LABELS

Engraved PVC labels shall be provided on all incoming and outgoing feeder. Circuit diagram showing the arrangements of the circuit inside the distribution panels shall be pasted on inside of the panel door and covered with transparent plastic sheet.



#### 11. Specific conditions, codes, List of vendors, quality Assurance Plan for Electrical works

#### 1. GENERAL

These special conditions are intended to amplify the General Conditions of Contract, and shall be read in conjunction with the same. For any discrepancies between the General Conditions and these Special Conditions, the more stringent shall apply.

This tender shall act as a guide to the type of system desired for the project. The specifications described in this tender are as per the 'Basis of Design' and are the minimum required from the tenderer. The features offered over and above those mentioned in the tender shall be given due credit.

Standard literature, not complying to the format and requirement of this tender, submitted by the contractor, shall not be considered or evaluated.

2. SCOPE OF WORK (SUPPLY, INSTALALTION, TESTING AND COMMISSIONING OF THE WORK AS PER BOQ IN ACCORDANCE TO TECHNICAL SPECIFICATION AND COMFORMING TO ELECTRICAL ACT).

The general character and the scope of work to be carried out under this contract is illustrated in Drawings, Specifications and Schedule of Quantities. The Tenderer shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Owner's site representative. The tenderer shall furnish all labour, materials and equipment, as listed under Schedule of Quantities and specified otherwise, transportation and incidental necessary for supply, installation, testing and commissioning of the complete electrical system as described in the Specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed under this contract.

The electrical system shall comprise of following:

- a) Cables (HT / LT), Mains and Sub-Mains.
- b) Cables on cable trays and / or within suspended ceiling spaces including installation, cable trays, hangers, supports, cable terminations and all fixing accessories.
- c) Supply and installation of conduits / cabling and wiring for Voice & Data Network.

#### 3. ASSOCIATED CIVIL WORKS

Following civil works associated with Electrical installation are excluded from the scope of this contract except for all minor civil work like wall chasing by chase cutter, making holes etc. for installation of conduits/cables and making good as it was as earlier. These shall be executed by other agencies in accordance with approved shop drawings of, and under direct supervision of the electrical tenderer.

- a. RCC Trenches inside Sub-station ,DG room and LT panel room for laying of LT cables.
- b. PCC foundation blocks with angle iron frame work edging for Transformer, DG Sets, all motor control centre.
- c. Air-tight fire doors with minimum one hour fire rating for Electrical rooms, UPS rooms and other equipment rooms as per requirement of CFO.
- d. Repair of all disturbed surfaces/openings made by Electrical Tenderer.
  - e. RCC foundation with angle iron frame work (properly painted/ fire retardant paint) at the edges to protect these from damage.

## 4. PROJECT EXECUTION, MANAGEMENT & COORDINATION

The Contractor shall ensure that senior planning and erection personnel from his organisation are assigned exclusively for this project. They shall have adequate experience in this type of installation. The Contractor shall appoint one Project Director holding senior management position in the organization. He shall be assisted on full time basis by a minimum of three erection engineers with minimum 5 years experience & three senior supervisors. The entire staff shall be posted at site on full time basis.

The project management shall be through modern technique.

For quality control & monitoring of workmanship, contractor shall assign at least one full-time engineer who would be exclusively responsible for ensuring strict quality control, adherence to specifications and ensuring top class workmanship for the electrical installation.

The Contractor shall arrange to have mechanised & modern facilities of transporting material to place of installation for speedy execution of work.

It is understood that over and above normal project coordination, the Contractor shall ensure the overall compatibility of its systems with all applicable trades (i.e. Architectural, Structural, HVAC, Fire Protection, Plumbing, Telecommunications, Fire Alarm, Security, etc). The Contractor shall check all trade shop drawings to verify the space in which its equipment and materials will be installed to insure adequate headroom and access for maintenance is provided. Where space conditions appear to be inadequate, the Contractor shall notify the Owner prior to any installation work.

The electrical Contractor shall provide, in addition to drafting and engineering personnel, a Coordination Manager to act as the single point of contract for all coordination related activities. Electrical Coordination Manager in addition to the above shall be a dedicated Project Engineer to the coordination process with adequate experience in similar works.

4.1 The Contractor shall prepare large scale comprehensive coordinated CAD drawings in conjunction with all other specialty trades, indicating clearances with structural and architectural construction. All other Contractors shall overlay their work on these CAD drawings utilizing individual CAD layers to produce final coordinated CAD drawings clearing all interferences with all adjacent activities and structures. This includes backgrounds for all areas above and below raised floors as applicable.

4.2 All drawings and drawing layers shall be created in a format compatible with the owner's CAD system.

4.3 The Contractor shall coordinate with all trade drawings and specifications.

4.4 The Contractor will be responsible for providing its services as defined in the drawing sequence below and shall attend all coordination meetings as scheduled by the Construction Manager.

4.5 In preparing the Shop Drawings, the Contractor will utilize a CAD document sheet of the same size as the Owner's Contract Drawings. The format should be similar and the lettering shall be at least one-eighth inch high.

4.6 Upon completion of the sheet metal drawings, the Contractor shall forward the CAD documents to the next Contractor who shall super-impose its equipment and piping utilizing a different CAD layer. The Contractor shall prepare CAD backgrounds in all areas for coordination regardless of the need for sheet metal in that area. In rotation, the HVAC, Plumbing, Fire Protection, Electrical (to include lighting), Telecommunications (as required), Fire Alarm (as required), Elevator (as required) and Security Contractor (as required) shall super-impose their work on the CAD document using individual layers. Each trade shall have a distinctive CAD layer and colour. (Note: All distribution and routing of coordination documents is to be accomplished via electronic file transfer or by the messenger (at contractor's expense) of the disks containing the appropriate files provided by the Contractor who is distributing the files. Messenger costs are included in the Contract. At each transmission of drawings, the Construction Manager shall be forwarded a copy of the corresponding transmittal.) After the last contractor has completed superimposing its work on the CAD document, a meeting will be held at which time all interferences between the various trades and the sequence of installation will be resolved. The electrical Contractor will bring to this meeting a colour reproducible layer of the composite drawings. The resulting changes will be noted on the drawings and all participants will sign the marked up coordinated drawing. Any and all overtime necessary for drafting, coordination, meetings, etc., to maintain the project schedule, is included.

4.7 The Contractor will then make the required amount of blue prints, reproducible and CAD files for distribution to the Construction Manager (1) mylar, (1) sepia and (2) prints), the Owner, Architect, Engineer, Commissioning Authority and associated Contractors [(1) print each]. The signed mylars will remain on file at the Construction Manager's office.

4.8 After submission and approval of the coordination drawings, the Contractors will transfer to their Shop Drawings any changes made during coordination meetings which affect their work. Prior to submission for Approval, the Shop Drawings will indicate that they reflect the result of coordination between all trades and the date of coordination completion. Copies of the coordinated drawings must be distributed to all parties involved.

4.9 Should contractor install its work without coordination, and this work interferes with either this or another trade, it will be solely responsible for all changes (ie. costs to other trades should they be required to relocate) resulting from installing without coordination. Should there be interference in the field after coordination; the trades involved will be required to resolve the problem.

4.10 The Owner will not be responsible for costs incurred from the lack of coordination between the work of the trades.

### 5. BYE-LAWS AND REGULATIONS

The work shall be carried out to the satisfaction of the Owner's site representative and in accordance with the Specifications, Regulations of the Electric Supply Authority, Indian Electricity Rules and Regulations, latest Indian Standards.

Following codes shall be referred while finalizing the scheme:

- Α. National Fire Protection Association (NFPA) - USA :
  - 1. No. 70-90 or 70-93 National Electric Code (NEC) 2.
    - No. 72-1993 National Fire Alarm Code
  - 3. No. 101-91 Life Safety Code 4.
    - No. 92A Practice for Smoke Control System
    - **Telecommunication Facilities** No. 76
  - **Clean Room Applications** 6. No. 318

Underwriters laboratories Inc. (UL) - USA:

5.

- 1. UL 50 Cabinets and Boxes
- UL 268Smoke Detectors for Fire Protective Signaling Systems 2.
- UL 864Control Units for Fire Protective Signaling Systems 3.
- 4. UL 268A Smoke Detectors for Duct Applications
- UL 521 Thermal Detectors for Fire Protective Signaling Systems 5.
- 6. UL 228Door Closers-Holders for Fire Protective Signaling Systems
- UL 464Audible Signaling Appliances 7.
- UL 38 Manually Activated Signaling Boxes 8.
- UL 346Water flow Indicators for Fire Protective Signaling Systems 9.
- 10. Power Supplies for Fire Protective Signalling Systems UL 1481
- 11. UL 1076 Proprietary Burglar Alarm Units and Systems
- 12. UL 1971 **Visual Notification Appliances**

Equivalent European standards shall be acceptable in lieu of UL standards.

- C. NationalBuilding Code - 2005
- D. Local Fire Codes

#### 6. FEES AND PERMITS

The Tenderer shall pay any and all fees and obtain permits required for the installation of this work. On completion of the work, the tenderer shall obtain and deliver to the Owner's certificate of final inspection and approval by the local electricity authority (CFO/ Municipal, State/Central govt./Fire safety whichever is applicable) at its own cost Owner's not to pay for any clearances. The contractor is liable to take necessary permits and approvals for the entire electrical installation works pertaining to HVAC, Plumbing, Fire Fighting and other allied engineering services.

#### 7. DRAWINGS

The Drawings which may be issued with tenders, are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These Drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The architectural/interiors drawings and details shall be examined for exact location of equipment. electrical points & fixtures.

The tenderer shall follow the tender drawings in preparation of his shop drawings, and for subsequent installation work. He shall check the drawings of other trades to verify spaces in which his work will be installed.



Maximum headroom and space conditions shall be maintained at all points. Where headroom appears inadequate, the tenderer shall notify the Architect / Consultant / Owner's site representative before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and tenderer shall rectify the same at his own cost. The tenderer shall examine all architectural, structural, plumbing, HVAC and other services drawings and check the built works before starting the work, report to the Owner's site representative any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Architect/Consultant/ Owner's site representative without additional cost to the Owner's.

#### 8. SPECIFICATIONS

The Specifications shall be considered as part of this contract. The Drawings indicate the extent and general arrangement of power distribution, location of lighting the fixtures, controlling switches, wiring system, cabling and earthing. These drawings are essentially diagrammatic. The Drawings indicate the point of termination of conduit runs and broadly suggest the routes to be followed. The work shall be installed as indicated on the Drawings. However, any change found essential to coordinate the installation of this work with other trades shall be made without any additional cost to the Owner's. The data given herein and on the Drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings are for the guidance of the tenderer, exact locations, distances and levels shall be governed by the site conditions and the Architectural & Interior layouts.

#### 9. SHOP DRAWINGS

9.1 All the shop drawings shall be prepared on computer through AutoCAD System based on Architectural Drawings, site measurements and Interior Designer's Drawings. Within eight weeks of the award of the contract, tenderer shall furnish, for the approval of the Architect/ Consultant, two sets of detailed shop drawings of all equipment and materials including layouts for all conduit layouts, distribution panels, switch boards, cabinets, special pull boxes, cable trays and any other requirement to be fabricated or purchased by the tenderer.

9.2 These shop drawings shall contain all information required to complete the Project as per specifications and as required by the Architect/Consultant/ Owner's site representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other tenderers. E0ach shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings.

Each item of equipment/material proposed shall be a standard catalogue product of an established manufacturer strictly from the manufacturers listed in Appendix-IV. When the owner makes any amendments in the above drawings, the tenderer shall supply two fresh sets of drawings with the amendments duly incorporated along with check print, for approval. The tenderer shall submit further six sets of shop drawings to the Owner's site representative for the exclusive use by the Owner's site representative and all other agencies. No material or equipment may be delivered or installed at the job site until the tenderer has in his possession, the approved shop drawing for the particular material/ equipment/installation.

9.3 Shop drawings shall be submitted for approval sufficiently in advance of planned delivery and installation of any material to allow owner ample time for scrutiny. No claims for extension of time shall be acceptable due to his failure to produce shop drawings at the right time, in accordance with the approved programme.

9.4 Manufacturers drawings, catalogues, pamphlets and other documents submitted for approval shall be in four sets. Each item in each set shall be properly labelled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

9.5 Samples of all materials like conduits, accessories, switches controls, control wires etc shall be submitted to the Owner's site representative prior to procurement. These will be submitted in two sets for approval and retention by Owner's site representative and shall be kept in their site office for reference and verification till the completion of the Project.

9.6 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the tenderer of the responsibility or requirement to furnish material and perform work as required by the contract.

9.7 Where the tendered proposes to use an item of equipment, other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, wiring or any other part of the mechanical, electrical or architectural layouts; all such re-design, and all new drawings and detailing required therefore, shall be prepared by the tenderer at his own expense and gotten approved by the Owner's site representative.

9.8 The tendered shall extend full cooperation to HVAC and other engineering services tenderer in preparation of his coordinated services drawings. He shall issue floppies and hard prints of his shop drawings to HVAC and other engineering services tenderer well in advance to complete the co-ordinate services drawings in accordance with schedule prepared by the Owner's site representatives. Where the work of the tenderer has to be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Owner's site representative, the tenderer shall prepare composite working drawings and sections at a suitable scale, not less than 1:50, clearly showing how his work is to be installed in relation to the work of other trades. If the Tenderer installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the Owner's.

## 10. ACCESSIBILITY

The Tenderer shall verify the sufficiency of the size of the shaft openings, clearances in cavity walls and suspended ceilings for proper installation of his ducting and piping. His failure to communicate insufficiency of any of the above shall constitute his acceptance of sufficiency of the same. The Tenderer shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels, requiring attendance, shall be finalized and communicated in sufficient time, to be provided in the normal course of work. Failing this, the Tenderer shall make all the necessary repairs and changes at his own expense. Access panel shall be standardized for each piece of equipment / device / accessory and shall be clearly nomenclature / marked.

## 11. MATERIALS AND EQUIPMENT

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with list of approved manufacturers as per Appendix - III.



The Tenderer shall be responsible for the safe custody of all materials and shall insure them against theft or damage in handling or storage etc. A list of items of materials and equipment, together with a sample of each shall be submitted to the Owner's site representative within 15 days of the award of the contract. Any item which is proposed as a substitute, the tenderer shall state the credit, if any, due to the Owner's. In the event the substitution is approved, all changes and substitutions shall be requested in writing and approvals obtained in writing from the Owner's site representative.

#### 12. MANUFACTURERS INSTRUCTIONS

Where manufacturer has furnished specific instructions, relating to the material and equipment used in this project, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

#### 13. COMPLETION CERTIFICATE

On completion of the electrical installation a certificate shall be furnished by the Tenderer countersigned by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local, state/central govt./ municipal / fire authorities concerned.

### 14. INSPECTION AND TESTING

The Owner's may carry out inspection and testing at manufacturer's works for this contract. No equipment shall be delivered without prior written confirmation from Engineer. All expenses related to testing shall be to tenderer account. Tests on site of completed works shall demonstrate the following among other things.

That the equipment installed complies with specification in all respect and is of the correct rating for the duty and site conditions.

That all items operate efficiently and quietly to meet the specified requirements. That all circuits are correctly protected and that protective devices are properly co-ordinated.

That all non-current carrying metal parts are properly and safely grounded in accordance with the specification and appropriate Codes of Practice. The tenderer shall provide all necessary instruments and labour for testing, shall make adequate records of test procedures and readings, shall repeat any tests requested by the Owner's and shall provide test certificate signed by a property authorised person. Such test shall be conducted on all materials and equipment and tests on completed work as called for by the Owner's at tenderer's expenses unless otherwise called for. If it is proved that the installation or part thereof is not satisfactorily carried out then the tenderer shall be liable for the rectification and resetting of the same as called for by the Owner's decision as to what constitutes a satisfactory test shall be final.

The above general requirements as to testing shall be read in conjunction with any particular requirements specified elsewhere. All tests shall be carried out by a test house approved by the Owner's.

Tenderer / Contractor is responsible for satisfactory operation of entire electrical installation detailed in this tender although item may have been inspected at manufacturer's works.

### 15. COMPLETION DRAWINGS

Upon the completion of the work and before issuance of certificate of virtual completion the tenderer shall submit to the Owner's site representative four setsof layout drawingsin progressive manner for individual systems drawn at approved scale indicating the complete wiring system as installed. Drawings shall be prepared on AUTO-CAD (latest version). Along with the hard copies, the tenderer shall submit copies of all drawings on floppies/CD. These

drawings must provide:

- a. Panel layouts, as installed single line diagram & control wiring.
- b. Cable Trays layout with number and size of cables installed.
- c. Run and size of conduits, inspection, junction and pull boxes.
- d. Number and size of conductors in each conduit with phase identification.
- e. Location and rating of sockets and switches controlling the lighting and power outlets.
- f. Location and details of distribution boards/panels, mains, switches along with phase balancing details.
- g. A complete wiring diagram as installed and single line diagrams showing all connections in the complete electrical and security system.
- h. Location of all earthing stations, route and size of all earthing conductors manhole.
- j. Layout and particulars of all LT cables.

k. Instruction, maintenance and operation manuals including maintenance schedule for all equipment. Testing & commissioning reports of all electrical equipment.

#### 16. OPERATING INSTRUCTION & MAINTENANCE MANUAL

#### 16.1 GENERAL

Upon completion and commissioning of part electrical &LV system the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment.

The Contractor shall provide operating instructions and maintenance data books for all equipment and materials furnished under this Division as well as assist the Commissioning Agent in compiling and consolidating O&M information during the development of the site specific Commissioning Plan.

The Contractor shall deliver two (2) initial copies of the operation and maintenance manuals in accordance with the subcontractor Scheduling Procedures to the Owner and Engineer for review. The initial copies shall contain all the information available at the time of submission.

The Contractor shall thereafter Submit six (6) final copies of operation and maintenance manuals to the Owner and Engineer for review at least ten (10) weeks before Final Review of the Project. Assemble all data in a completely indexed volume or volumes in three ring binders and identify the size, model and features indicated for each item. The binders shall have the Project Name and Logo printed on the outside of the binders. Resubmittals of these final six (6) copies of the "Final Review" operation and maintenance books and two (2) electronic CD-RW recordable rewrite compact disc shall be delivered to the Owner upon Final Completion of the Project

The vendor / manufacturer shall supply complete operations and maintenance manuals in accordance with the following requirements:

- a. The operations and maintenance manual documentations shall be presented in a heavy duty white binder or equivalent at the time of original submission, and record manuals within four weeks of integrated delivery of equipment to the site.
- b. The binder shall have a cover page depicting the system(s) covered by the manual, Owners name, site location, and date.
- c. The binder shall contain a detailed table of contents page delineating all major sections of the manual. Each section of the manual shall have an Avery narrow tab type divider placed between sections (properly labelled) to ensure easy access. The major sections of the manual shall include:

Include the following information where applicable:

- i. Manual index
- ii. Specification Section reference number and index.
- iii. Description of the work carried out / installed.
- iv. Operating instructions.
- v. Maintenance instructions including procedures for preventive maintenance.
- vi. Trouble shooting charts.
- vii. Type and routine test certificates of major items.
  - viii. Equipment and/or material model number and serial numbers.
  - ix. Identifying name, mark number, plan/drawings tagging, etc.
  - x. Locations of major equipment (where several similar items are used, provide a list).

Tender No. -NATRAX/PROC/C&I/23/----

- xi. Manufacturer's catalogue literature including model, type, style, complete standard factory operations manual, brand name data, etc.
- xii. Installation manual
- xiii. Detailed sequences of operation for all operating modes
- xiv. Supplier, dealer, distributor, vendor and service organizations including phone, fax and email addresses and name of contact person.
- xv. "Final Review" or approved submittals.
- xvi. Dimensional drawings with equipment weights
- xvii. List of spare parts recommended for normal service requirements.
- xviii. List of Spare parts purchased as part of this project,
- xix. Performance curves and data including part load curves were applicable.
- xx. Wiring and interlock wiring diagrams in both system and ladder formats.
- xxi. Motor ratings and actual loads.
- xxii. Assembly and disassembly instructions with exploded view Drawings where available.
- xxiii. Manufacturer's recommended operation and maintenance instructions with all non-applicable information deleted.
- xxiv. Trouble shooting diagnostic instructions where available.
- xxv. Sequences of operation.
- xxvi. Copy of all warrantees and guarantees.
- xxvii. Copy of all factory and field test reports.
- xxviii. Completed Functional Test sheets.
- xxix. Completed Pre-functional check lists
- xxx. Copies of all "Data" Sheets

Items required for inclusion in the operations and maintenance manuals that cannot be provided four weeks after delivery of equipment to the site are expected to be submitted within two weeks of completion of the work in a format for insertion into the binder under a pre-fabricated tab that is identified in the table of contents (i.e. The site acceptance test may not be complete at the time this manual is required for submission, in this case the manufacturer shall submit the manual with this section empty, upon completion of the site acceptance testing the forms for this testing will be supplied (punched for the binder).

All documents shall be submitted electronically using CD in a dedicated sleeve within the binder.

### 16.2 SPECIAL CONTROL SYSTEM O&M MANUAL REQUIREMENTS

In addition to documentation that may be specified elsewhere, the controls contractor shall compile and organize at minimum the following data on the control system in labeled 3-ring binders with indexed tabs.

16.2.1 Three hard copies, as well as on disk in latest Word format, of the controls training manuals in a separate manual from the O&M manuals.

16.2.2 Operation and Maintenance Manuals in hard copy as well as on disk in latest Word format, containing:

a. Specific instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. These instructions shall be step-by-step. Indexes and clear tables of

contents shall be included. The detailed technical manual for programming and customizing control loops and algorithms shall be included.

- b. Full as-built set of control drawings (refer to submittal section above for details).
- c. Full as-built sequence of operations for each piece of equipment.
- d. Full print out of all schedules and set points after testing and acceptance of the system.
- e. Full as-built print out of software program.
- f. Electronic copy on disk of the entire program for this facility.
- g. Marking of all system on the as-built floor plan and electrical drawings with their control system designations. (obtain a disk of as-built and coordination drawings from the electrical contractors)
- h. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
- i. Control equipment component submittals, parts lists, etc.
- j. Warranty requirements.
- k. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).

16.2.3 The manual shall be organized and subdivided with permanently labeled tabs for each of the following data in the given order:

- a. Sequences of operation
- b. Control drawings
- c. GA drawings of panels
- d. Lighting & Power details
- e. Sensors and switches
- f. Program setups (software program printouts)

16.2.4 Field checkout sheets and trend logs should be provided to the Commissioning Agent for inclusion in the Commissioning Record Book

#### 16.3 REVIEW AND APPROVALS

Review of the commissioning related sections of the O&M manuals shall be made by the Owner's representative and by the Commissioning Agent.

#### 17. COMPOSITE CONTROL WIRING DIAGRAM REQUIREMENT

As required by the construction schedule developed by the Construction Manager, this Contractor, along with all other Division Contractors, shall furnish to the BMS Contractor, the project specific wiring and interlock requirement diagrams from the equipment shop drawings for those items of equipment where there is joint wiring interface responsibility. These wiring and interlock diagrams will be furnished to allow the BMS Contractor to prepare project specific composite control wiring diagrams that will detail how equipment furnished by the multiple Contractors shall be interconnected to provide fully functioning interrelated systems, including the life safety system, for the overall project.

The items for which the wiring and interlock diagrams shall be furnished shall include but not be limited to lighting relays and/or contactors for the remote control of or by lighting systems, electronic meters, the Fire Detection, Alarm and Communication (Class E) System, the Security System, etc.

The wiring diagrams furnished to the BMS Contractor shall indicate those terminals and field devices which will be provided for the use of the BMS Contractor(s) to define the control interconnection to allow the interrelated systems to function as specified and as required by all applicable Codes. The BMS Contractor shall add to these drawings, those connections they will

make for the control and/or monitoring of the lighting, electronic meters, and other items of equipment. The completed diagram shall include all line and low voltage wiring between control devices, control relays, sensors, controllers, switches, the Fire Command Station, the Security System, the Building Management System, etc.

One diagram shall be provided for each item or piece of equipment. Diagrams shall be suitable for insertion in a three-ring -binder. The BMS Contractor shall complete the preparation of the composite control wiring diagrams and shall return them to the appropriate Contractors within six (6) weeks of receiving them. The Contractors shall verify that the wiring added to the drawings is correct and can be accommodated. If necessary, corrections shall be made by the BMS Contractor. This process shall be completed prior to commencement of work on the particular piece of equipment or in the area within which the equipment is located.

The intent of this requirement is that single composite drawings shall be available for each item of equipment indicating the wiring that shall be installed in its entirety including interlocks. Any omissions or errors noticed by the Contractors shall be brought to the attention of the Engineer immediately.

Each conductor termination on the composite wiring diagram shall be suitably identified by a termination number or symbol. In addition, each conductor termination shall be suitably indexed to identify the termination location of the other end of the wire.

All internal wiring of panels (in detail) shall be included in the composite wiring diagram. For such items as motor starters, etc., all jumpers added or removed shall be clearly indicated as being "added" or "removed".

The composite wiring diagrams shall include description of the interlock sequence of operation. The description shall include complete identification of each item shown (relay, lighting controller, etc.), and each item's exact operation shall be related to the interlock sequence.

This Contractor and their Subcontractors shall coordinate the work of this Division with the requirements of the work of all other Division Contractors as to the need for terminal strips, etc., required by them to interface with and/or control equipment furnished under this Division.

## 18 OPERATING INSTRUCTIONS AND TRAINING

This Contractor shall be responsible for the training of Owner personnel for both the equipment and systems this contractor installs as well as responsible to participate in the training of all systems that interface with the work of other Contractors and Vendors. The Contractor shall, in addition to start up services, provide factory trained specialists to supervise commissioning and instruct the Owner's operators during operating instruction periods.

In addition, the manufacturer of the pre-purchased equipment shall furnish the services of factory trained specialists to instruct the Owner's operators as set forth in the specifications and the pre-purchased documents. The operating instruction periods shall be as defined in pre-purchase documents. This contractor shall provide all labor and assistance required to properly execute all aspects of the requirements set forth for training.

Training shall consist of a minimum numbers of hours as listed below (minimum of 4 hours if not shown) of Owner instructions. Days shall not be defined as 8 hour periods, shall not be consecutive, and are separate and apart from start-up and commissioning. This shall consist of both classroom and in-the-field training. All training materials and a training curriculum unique to this project will be presented to the Owner 2 months in advance of the on-site training. Training will commence only after the approval of the curriculum and agenda by the Owner and the Commissioning Agent. The Owner may wish to videotape the on-site training.

The Contractor and their vendors agree to allow videotaping of instruction periods. Include in addition to the periods of training listed.

- a. periods at night for training of night shift personnel
- b. periods for use of the equipment for temporary lighting & power
- c. periods to be present during Owner instruction on the BMS
- d. periods of training on major vendor furnished components such as transformer, HT Panel, lighting control, LT & distribution panel operation by the equipment manufacturer.

The Contractor shall commence no instruction period until all requirements of this section are met and the Owner has issued his written acceptance of the contractor's submitted agenda, starting time and Schedules.

The Construction Manager shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.

The electrical contractor shall provide the Commissioning Agent with a training plan at least two months before the planned training according to the following outline:

- a. Equipment (included in training)
- b. Location of training
- c. Objectives
- d. Subjects covered (description, duration of discussion, special methods, etc.)
- e. Duration of training on each subject
- f. Instructor qualifications and experience for each subject
- i. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
- ii. Include a review of all systems using the simplified system schematics, riser, and one-line drawings.
- iii. Include a review of all as-built drawings.
- iv. Basic engineering principals of operation for each piece of equipment
- v. Equipment submittal data and performance curves.
- vi. Equipment construction.
- vii. Equipment safeties and alarms.
- viii. Equipment alarm and program settings
- ix. Operation limitations/ restrictions
- x. Opération modes/ (response-action format)
- xi. Failure modes / (response-action format)
- xii. Maintenance modes /(response-action format)
- xiii. Control power and appurtenance.
- xiv. Include field walk-throughs to locate all concealed devices, review valve, duct and pipe tagging method, review equipment locations and tagging.
- xv. Discussion of relevant health and safety issues and concerns.
- xvi. Discussion of warranties and service contracts.
- xvii. Common troubleshooting problems and solutions.
- xviii. Location of all plans and manuals in the facility.
- xix. Discussion of any peculiarities of equipment installation or operation.
- xx. Demonstration of all electronically transmitted data and graphics.
- xxi. Sources for replacement parts/equipment and emergency service.

xxii. Tenant interaction issues; and why certain features are environmentally responsive (i.e., save energy, lighting control, metering, improve indoor air quality (IAQ), reduce toxic materials, reduce waste).

This shall consist of a detailed, high quality training program in Power Point format to be reviewed and approved by the Commissioning Authority. The slides shall include graphs, detailed photographs, and one line diagrams for power, control, and flow to illustrate the above training requirements. Photographs shall include equipment with covers on and off, all appurtenances, and other related equipment.

During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the training.

The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.

The mechanical contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not *controlled* by the central building control system.

#### 19. PARTIAL ORDERING

Owner through the Consultant/ Construction manager reserves the right to order equipment and material from any and all alternates, and /or to order high side and /or low side equipment and materials or parts thereof from one or more tenderers.

#### 20. TOOLS AND TACKLES

The Tenderer shall provide and install all necessary hoists, ladders, scaffolding, tools and tackles, all transport for labour and materials and plant necessary for the proper execution and completion of the work to the satisfaction of the Owner's site representative.

JCB with fuels and driver for excavation of tranches will be provided by natrax.

## LIST OF INDIAN STANDARDS (IS)

IS : 374 - 1979 IS : 694 - 1990	Ceiling fans and regulators (3rd revision) PVC insulated Electric cable for working voltage upto and including 1100 volts.
IS : 732 - 1989 IS:1255 – 1983	Code of practice for electrical wiring and installation Code of Practice for installation and maintenance of Power Cables upto and including 33 KV rating (Second Revision)
IS:1258 - 1987 IS:1293 - 1988	Bayonet lamp holders(Third revision) Three pin plugs and sockets outlets rated voltage upto and including 250 volts and rated current upto and including 160 amps.
IS:1554-1988 (Part -I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts. Electrical installation fire safety of buildings (general) Code of practice.
IS:1646 - 1982 IS:1885 - 1971 IS:1913 - 1978	Glossary of items for electrical cables and conductors General and safety requirements for fluorescent lamps luminaries Tubular.
IS:2026 - 1977 to 81	Power Transformers
IS:2071-1974-76	Methods of high voltage testing Protection of huilding and allied structures against lightning
IS:2551-1982	Danger notice plate.
IS:3043 - 1987	Code of practice for earthing.
IS:3480 - 1966	Flexible steel conduits for electrical wiring.
IS:3837 - 1976	Accessories for rigid steel conduit for electrical wiring.
IS:4615 - 1968	Switch socket outlets.
IS:5133 - 1969 (Part - I)	Boxes for the enclosure of electrical accessories.
IS:5216 - 1982 (Part-I) IS:5424 - 1969	Guide for safety procedures and practices in electrical work. Rubber mats for electrical purposes.
IS:5578& 11353-1985 IS:7098 – 1985 (Part - II)	Marking and arrangement of bus bars Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV upto and including 33 KV
IS:8130 - 1984	Conductors for insulated electric cables and flexible cords
IS:8623 -1977 (Part -I)	Factory built assemblies of switchgear and control gear for voltages
IS:8623 – 1980 (Part - II)	Bus Bar trunking system
IS:8828 - 1996	Miniature Circuit Breakers
IS:9537 - 1981	Rigid Steel Conduits for electrical wiring (Second Revisions)
IS:10810-1988	Methods of test for cables.
IS:12040-1988 IS:13047 1003 (Port	Larth Leakage Circuit Breakers
)	
IS:13947-1989	Moulded Case Circuit Breakers
IS:13947-1993	Degree of protection provided by enclosures for LV switchgear and control gear.



IS:13947-1993	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.
IS:1651&1652 1991	Stationary cells and batteries lead acid type.
IS: 13779	Digital measuring instrument and testing accessories.
IS:1651&1652 – 1991	Stationary cell & batteries, lead acid type.
IS:1885-1971	Glossary of items for electrical cables and conductors
IS:2551-1982	Danger notice plates.
IS:3043 - 1987	Code of practice for earthing.
IS:5133 – 1969 (Part -I)	Boxes for the enclosure of electrical accessories.
IS:5216-1982 (Part-I)	Guide for safety procedures and practices in electrical work.
IS: 5424 - 1969	Rubber mats for electrical purposes.
IS: 5578 & 1984	Guide for marking of insulated conductors
IS: 8130 - 1984	Conductors for insulated electric cables and flexible cords
IS:11353 - 1985	Guide for uniform system of marking and identification of conductors
	and apparatus terminals.
IS:13947- 1993	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.

#### ABBREVIATIONS

The following abbreviations have been used in the accompanying Specifications, drawings and Schedule of Quantities.

- G I stands for Galvanized Mild Steel.
- Cu stands for Copper
  - M S stands for Mild Steel.
- CU stands for copper.
- GI stands for Galvanised Iron (Mild Steel)
- V stands for Volts
- KV stands for Kilo Volts
- HV stands for High Voltage (3.3 KV and above)
- MV stands for Medium Voltage (110 V ,230 V ,415 V, 600 V)
- LV stands for Low Voltage (32 V & Below)
- HT stands for High Tension
- LT stands for Low Tension
- VCB stands for Vacuum Circuit Breaker
- PVC stands for Polyvinyl Chloride
- AMP stands for Amperes
- KWH stands for Kilowatt Hours
- KW stands for Kilo Watts
- BIS stands for Bureau of Indian Standards
- IS stands for Indian Standards
- IEE stands for Institution of Electrical Engineers London
- NEC stands for National Electrical Code
- ACB stands for Air Circuit Breaker
- ELCB stands for Earth Leakage Circuit Breaker
- MCB stands for Miniature Circuit Breaker
- MCCB stands for Moulded Case Circuit Breaker
  - SP stands for Single Pole
- DP stands for Double Pole

- TP stands for Triple Pole
- TPN stands for Triple Pole and Neutral
- MDB stands for Main Distribution Board
- SDB stands for Sub Distribution Board
- FDB stands for Final Distribution Board
- MCC stands for Motor Control Centre

### LIST OF APPROVED MAKES FOR EQUIPMENT & MATERIALS

S. No.	Details of Materials / Equipment	Manufacturer's Name
1.	Electrical Cables	Cable Corporation of India KEI RPG Polycab
2.	LT Jointing Kit / Termination	Birla-3M Raychem Mahindra Safe Kit
3.	Cable Glands	Braco Comet (Comex) Hex Brass
4	Bimettalic Cable Lug	Braco Comet Dowell's (Biller India) Hex Brass (Copper Alloy India)
5	Power and control cable & wire	Cable Corporation of India KEI RPG Polycab
4.	Terminal Block/Connector	Elmex Connectwell Wago Dowells
5.	Cable connector	D Link Molex Tyco Legrand Hager GE Opal equivalent



Drawing & design:

To be inserted



ANNEXURE-III

GEM	Detailed scope of work for					
BOQ ID	Supply, Installation, testing and Commissioning of Cable and allied					
	work					
ļ Ē	S.N	ITEM DESCRIPTION	UNIT	QTY		
ITEM 1	1	Supply of XLPE Insulated power cable (confirming IS- 7098 Part-I) 1100 Volt grade, 1 core armoured 70 Sq.mm ISI MARKED with Alu. Stranded /solid conductor	Metre	3500		
ITEM 2	2	Removal of existing 11kv cable from system and Supply of cable luggs. Gland, and re-laying of removed cable as per new requirement and make proper LT system operation including cable termination, shaddeling of cable on boundry wall, labour charges etc as per E i/c. Trench excavation for laying of 3.5 km cable made by natrax under contractor supervision. (labour if required that will arranged by contractor.)	L.S	1		
ITEM 3	3	Laying of one number armoured/unarmoured power cable 1.1KV grade of size exceeding 25sq. mm but not exceeding 120 sq. mm in the existing masonry open duct as required Or excavated trench.	Metre	3500		
ITEM 4	4	Heat shrinkable jointing kit 1.1 KV XLPE/HD cable straight through jointing kit (I.D./O.D.) 50-95 sq. mm. 1 core	Each	10		
ITEM 5	5	Heat shrinkable jointing kit 33 KV XLPE cable I.D. termination 70 sq mm.	Each	4		
		Note-Trench for laying of cable made by Natrax, LT system should be operational after the above work.				

## Bill of Quantities (BOQ)/Financial Bid

NOTE- Bidder need to quote in the GeM BOQ as per the details mentioning in this document & scope of work.

Signature of bidder