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**Electronics Corporation of India Limited**  
 A Government of India Enterprise  
 ECIL (P.O.) Hyderabad - 500 062. A.P.  
 PURCHASE/CONTROL & AUTOMATION GROUP

ENQUIRY No. EC/PUR/CAG/ 1964/451125

DATE : 2012.02.08

DUE DATE : 2012.03.01

Ph:

OFFICE COPY

Dear Sir(s)

Kindly submit your quotation in a sealed envelope superscribing enquiry No. and Due Date for the supply of the following items as per terms and conditions overleaf to PURCHASE MANAGER, CONTROL & AUTOMATION GROUP, ECIL, HYDERABAD. QUOTATIONS AGAINST EACH TENDER SHALL BE SENT IN SEPARATE ENVELOPE. QUOTATIONS RECEIVED AFTER THE DUE DATE AND TENDERS SENT IN OPEN/UNSUPERSCRIBED ENVELOPES WILL BE REJECTED. PLEASE SEND REGRET LETTER, IF YOU ARE NOT ABLE TO QUOTE TO CONTINUE TO KEEP YOUR NAME IN OUR MAILING LIST.

### IMPORTANT INSTRUCTIONS

Parties must give the following information otherwise offer may be rejected.

1. Unit Rate and Terms of Price
2. Quantity discount if any
3. Rate of Excise Duty Sales Tax/VAT if any
4. Definite Delivery schedule
5. Mode of despatch
6. Estimated Packing and Forwarding Charges
7. Validity of quotation
8. Terms of payment
9. Sales Tax / TIN / Service Tax Registration Number
10. SS/NSI Regn. No.

Sl. No.	Material Description and Specification	Estimated Requirement	
		Unit	Quantity
	Control & Instrumentation Cabling Works at PFBR Project, Kalpakkam Procedure for Control Cable Laying and Glanding is as per Annexure-1		
1	Laying of Unarmoured Signal/Control/Power/OFC Cables of OD : up to 20 mm	Mtrs.	1,20,000.00
2	Laying of Unarmoured Signal/Control/Power Cables of OD : 21 to 40 mm	Mtrs.	20,000.00
3	Glanding of Cables of OD : up to 20 mm Supply of Glands excluded	Nos.	6,000
4	Glanding of Cables of OD : 21 to 40 mm Supply of Glands excluded	Nos.	1,500
5	Laying of 1" GI Rigid Conduit and Accessories Supply of Conduits & Accessories excluded	Mtrs.	20,000.00
<b>Special Notes.</b>			
1. General Information, Terms and Conditions are as per Annexure-2.			
2. QAP and Cheklist for Laying of Cables and GI Conduits as			

- Note: 1. COC/BC/TC SHALL BE FURNISHED  
 2. DATA SHEETS (CATALOGUE) SHALL BE SUPPLIED  
 3. IF THE MATERIAL IS COVERED UNDER DGS & D RATE CONTRACT PLEASE QUOTE THE RATES ACCORDINGLY

Contd ..

Yours faithfully,  
 For Electronics Corporation of India Limited

**T. DHANAMJAYA RAO**  
 उप महा प्रबंधक / Dy. General Manager  
 कृष्णा ए डी/ई सी आई एल,  
 PURCHASE-CAD/ECIL  
 हैदराबाद / HYDERABAD 500 062

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- |                                             |                                                      |
|---------------------------------------------|------------------------------------------------------|
| 1. Unit Rate and Terms of Price             | 6. Estimated Packing and Forwarding Charges          |
| 2. Quantity discount if any                 | 7. Validity of quotation                             |
| 3. Rate of Excise Duty Sales Tax/VAT if any | 8. Terms of payment                                  |
| 4. Definite Delivery schedule               | 9. Sales Tax / TMI / Service Tax Registration Number |
| 5. Mode of despatch                         | 10. SS/NSI Regn No.                                  |

Sl. No.	Material Description and Specification	Estimated Requirement	
		Unit	Quantity
	per Annexure-3. 3. Commercial Terms and Conditions as per Annexure-4. 4. This is TWO PART BID. Techno-commercial bid shall comprise EMD of Rs. 3.0 Lakhs and signed copy of tender documents in compliance of specifications, terms and conditions.		

- Note : 1. COC/BC/TC SHALL BE FURNISHED  
 2. DATA SHEETS (CATALOGUE) SHALL BE SUPPLIED  
 3. IF THE MATERIAL IS COVERED UNDER DGS & D RATE CONTRACT PLEASE QUOTE THE RATES ACCORDINGLY

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 उप महा प्रबंधक / Dy. General Manager  
 क्रय-सी ए डी/ई सी आई एल,  
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 है राबाद/HYDERABAD-500 062

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Electronics Corporation of India Limited  
Prototype Fast Breeder Reactor Project, Kalpakkam  
Control & Instrumentation Cabling Works

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**PROCEDURE FOR CONTROL CABLE LAYING AND GLANDING**

**1.0 PURPOSE:**

This specification describes the requirement for laying and termination of various sizes of PVC/FRLS control cables, MI cables including laying of conduits for cable routing.

**2.0 APPLICABILITY:**

This procedure is applicable to Instrumentation Erection Work.

**3.0 RESPONSIBILITY:**

Responsibility of implementation of this procedure lies with instrumentation erection package contractor.

**4.0 REFERENCE:**

Standard practices followed in Nuclear Power Plants.

**5.0 PRE-REQUISITE :**

Cables, Double Compression Cable glands, Rigid and flexible conduits, conduit fittings, Cadmium plated spacers with clamps and screws, Lead plugs, Brass / cad. Plated screws, nuts etc., 20 mm (W) x 2mm thick Aluminum strips for making cable clamps, Anodized black aluminum tags size 100 x 20 x 2mm thick, PVC ties for tying cable tags, Millimeters, Meggers (Analog /digital) with readability up to 100 M. ohms at 500 V DC, knock out punches(Hydraulic/Manual) / hole-saw cutters, all other tools and tackles required for the job.

**6.0 DESCRIPTION:**

- 6.1. The control cables will be supplied in drums. IR value of the cable on drum shall be recorded. Before cutting the cables detailed measurement shall be taken in the field as per Site conditions. The quantity indicated in the cable schedule is only tentative. Cutting the cable for different length shall be such that wastage is minimum.
- 6.2. Cables are to be routed in already installed cable trays, conduits and on walls as per the cable schedule.
- 6.3. Pulling tension, sidewall pressure and radius at bend shall not exceed manufacturer's recommendations.
- 6.4. Cables routed on walls shall be secured by galvanized saddles and clamps at intervals of half meter.
- 6.5. All cables shall be neatly dressed and individually clamped at intervals of 1.5 M and 1.0 M for horizontal and vertical runs respectively with aluminum flats.
- 6.6. Cables used from instrument to Junction Box shall be routed through suitable size of conduits or Light channels. Slotted channel trays/light channels or conduits shall be supported at the intervals not exceeding 1m or as per site requirement. Cables shall be laid in the cable pans/trays/light channels in a neat and orderly fashion without disturbing the formation of the cables already laid.



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Prototype Fast Breeder Reactor Project, Kalpakkam  
Control & Instrumentation Cabling Works

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- 6.7. Each length of the cable shall be checked for continuity and insulation resistance using Meggar after laying and glanding is completed.
- 6.8. All control cables shall enter into Junction box and panels from the bottom.
- 6.9. If bottom entry on the JB is not feasible, side entry shall be attempted. However, to the extent possible cable entry from top of JB's shall be avoided.
- 6.10. All cables shall be terminated on a JB/Panel through glands. Separate glands shall be used for each and every cable.
- 6.11. Length of cable between Instrument and JB/Panel shall be minimum to avoid sagging.
- 6.12. The length of cable to be dressed inside the JB/Panel shall be such that, it will facilitate termination on any possible terminals if changes are incorporated.
- 6.13. Wherever Glands are used for cable termination suitable size of nickel plated brass double compression cable glands shall be used.
- 6.14. Wherever conduits are used for routing control cables, internal diameter of the conduit shall be at least twice of the cable diameter.
- 6.15. Metal tag bearing the cable number shall be provided to the cable on the entry of JB/panel. The cable no. shall be punched clearly on anodized aluminum rectangular tags and tied to the cable by black PVC sleeve at both ends. Cable tags shall be provided at an interval of 10 meters and at junctions, elevation changes, crossings and equipment end.
- 6.16. Conduit bend radius shall be as per standard practice i.e. at least 10 times the diameter of the conduit with a minimum of 7.5 cm as per IS-732 (Part-II).
- 6.17. All cables running up to a height of 1.5 M from the floor level shall be routed in conduits. Cable bundles must be routed through connecting trays from main cable pan as per the size of cable bundle.
- 6.18. All cables shall be laid without joints as far as practicable. However, Wherever required, cable jointing shall be done.
- 6.19. Cables shall be glanded in such a way that they will not crisscross inside panel / JB during termination.
- 6.20. Cable glands shall be secured to the JB/Panel by lockout and neoprene rubber gaskets.

**7.0 ACCEPTANCE CRITERIA:**

As per QAP. Good workmanship in laying, glanding and proper clamping is a must.

**8.0 RECORDS:**

Records shall be generated as per QAP.

**9.0 PRECAUTIONS:**

Following general precaution should be taken in routing the cables:

- a) While laying the cables underground, depth of laying is 900 mm from the surface.



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Prototype Fast Breeder Reactor Project, Kalpakkam  
Control & Instrumentation Cabling Works

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- b) Power and control cables shall be laid in separate conduits / trays.
- c) All cables screens wherever provided shall be earthed at one point only.
- d) Care should be taken to avoid sharp bending and kinking of conduits, damaging of insulation and stripping the cable beyond the pulling force. Minimum radius of formed bend of an insulated cable shall be 12D for unarmoured cable and 15D for armoured cable where D is the outer diameter of the cable.
- e) While terminating the cable at the instruments end an extra length in the form of a loop shall be provided to facilitate easy removal of the instrument.



## 1.0 GENERAL

This specification covers the installation of various types of Control & Instrumentation System panels, cabinets, Junction boxes at Prototype Fast Breeder Test Reactor, located at Kalpakkam 65 KM from Chennai, Tamil Nadu. The technical specification in the tender document is broad in nature. The specification and the accompanying annexures are intended to describe the scope and procedural requirements of entire work. It is to be understood and agreed by Contractor, that the work described shall be executed in every detail, even though every item necessarily involved is not particularly mentioned. The Contractor shall be required to provide all the required labour, materials, tools and equipments necessary for the completion of the work in all respects described and shall not avail himself of any manifesting unintentional error, omission or inconsistency that may exist.

It is not the intent to specify completely herein, all details of the design, construction and erection of the materials. However, the material/work shall conform in all respects to high standards of workmanship in installation, testing and commissioning and be capable of performing in a manner acceptable to ECIL/BHAVINI which will be entitled to reject any work or material which is not in full accordance with the specification/requirement.

Manpower deployed shall be experienced and qualified for carrying out installation, and inspection jobs associated with instrumentation & control systems.

## 2.0 PROJECT INFORMATION

The Project is a nuclear power plant coming up at Kalpakkam in the state of Tamil Nadu. For the safe and trouble free operation of the plant, reliable and accurate status of different process parameters is required to be made available to the operator. It is needless to emphasise that it is possible only by delivering the highest standards of quality during the stage of construction.

The project being a strategic nuclear facility of Dept. of Atomic Energy, Govt. of India, no publicity shall be given by tenderer/his employees in any form whatsoever without written permission from ECIL/BHAVINI. **All the information provided to the tenderer/contractor shall be deemed strictly confidential.** The tenderer/contractor is liable to be prosecuted under law for any violation in this regard.

Before submitting the tender, the tenderer will be deemed to have satisfied himself by actual inspection of the site, locality of works, approaches, availability of materials, infrastructural facilities, camping facility for work force etc. He will be deemed to have ensured that all conditions liable to be encountered during the execution of works are taken into account and that the rates are all inclusive in accordance with the conditions of the contract for the completion of the work to the satisfaction of the ECIL/BHAVINI. Non-familiarity as a reason, either for extra claims or for not carrying out the work in conformity with the specification, will not be entertained.

## 3.0 WORKMANSHIP

The Contractor shall ensure that the quality of workmanship is of the highest standard meeting all technical requirements and works executed to the satisfaction of ECIL/BHAVINI and in accordance with all relevant codes of engineering practices to ensure satisfactory operation over an expected life of 40 years.

The Contractor must rectify any defects due to his poor workmanship and/or his omission or misinterpretation of drawings, specifications or instruction given to him.



#### 4.0 SAFETY & HOUSEKEEPING

The contractor shall be responsible for taking all the safety precautions during construction and for keeping the site safe at all times for facilitating safe work by other contractors engaged at site. He shall comply with the instructions given by ECIL's Safety Officer/Supervisor.

The Contractor shall keep at all times the site free from accumulation of waste material and debris and upon completion of work shall clear away and dispose all the surplus material, rubbish etc. and shall leave the works and site clean and tidy.

#### 5.0 SPLIT/DELETION OF WORK

ECIL reserves the right to split/delete any portion of the work before or after the contract is awarded without assigning any reasons thereof. ECIL reserves the right to cancel full tender without assigning any reasons whatsoever.

#### 6.0 RECORDS

All jobs shall be executed as per approved procedures, Quality Assurance Plans and Checklists. The Contractor shall generate and maintain records pertaining to the work execution, quality control and inspection attesting compliance with all technical requirements.

#### 7.0 CONTRACTOR'S LIABILITY FOR LOSS, DAMAGE ETC.

Contractor shall take third party insurance policy of Rs. 5,00,000 (Rs. Five lakhs only). The insurance policy shall be kept alive for the entire period till the work is completed under this contract. The insurance policies shall include the ECIL / BHAVINI as beneficiary. This insurance policy shall be submitted immediately on the commencement of work.

The Contractor shall also indemnify ECIL from and against any liabilities towards manpower deployed by him and obtain suitable insurance policy such as Workmen Compensation Policy of suitable value to adequately cover all workmen deployed by him against all possible risks at work.

#### 8.0 DRAWINGS, INSTRUCTION MANUALS, RECORDS

Upon completion of work, the Contractor shall return all the drawings, instruction manuals issued to him for the purpose of erection and testing.

#### 9.0 COMPLIANCE WITH LABOUR LAWS

The Contractor shall strictly comply with all the provisions of labour laws and minimum wages act (central or state whichever is more advantageous to the workers) applicable to the construction in this area and rules framed thereunder from time to time. The Contractor should also obtain labour licence from licencing authority as per rules. The Contractor shall disburse monthly wages to workmen in presence of ECIL's representative. Contribution of Contractor towards PF together with workman's contribution shall be remitted monthly with the Regional PF Commissioner and the PF code number for each workmen be allotted. A copy of the Challans in proof of remittance shall be submitted to ECIL every month. The contractor shall comply with the provision of Payment of Wages Act, 1936, the minimum Wages Act, 1948, the Workman's compensation Act, 1923, the Industrial Disputes Act, 1952, the Contract Labour (Regulation & Abolition) Act, 1970, Equal Remuneration Act, 1976, Interstate Migrant Workmen Act, 1979 and/or any modifications thereof or any other related laws applicable/framed from time to time.



The contractor shall arrange ESI registration payment for the workmen employed by him as applicable.

The contractor shall maintain the following registers under the provision of Contract Labour Act, 1970:

Register of persons employed	Rgd No 75	XIII
Employment card	Rgd No 76	XIV
Service Certificate	Rgd No 77	XV
Muster Roll	Rgd No 78(1)(a)1	XVI
Register of wages	-----do.....	XVII
Register of wages cum Mustur roll...do...		XVIII
( in case wage period is fortnightly or less)		
Register of duductions for damage or loss	Rgd No 78(1) (a) ii	XX
Register of fines	As above	XXI
Register of advance	....do....	XXII
Register of Overtime	....do...	XXIII
Wage slips	Reg No 78(1)(b)	XIX

The Contractor shall indemnify ECIL from and against any claim, penalties, recoveries under the above acts and rules.

**10.0 ACCOMMODATION, TRANSPORT TO WORKMEN/STAFF**

Contractor shall arrange for accommodation, transport, canteen and medical facility for all workmen/staff deployed by them at work. ECIL shall not be responsible for arranging any such facilities to the Contractor's workmen/staff.

**11.0 ENTRY PERMITS TO STAFF**

Contractor shall arrange for all required documents for issue of entry permits to staff/workmen engaged by them at work. **Police Verification Certificate is a must for issue of entry permits by CISF.**

**12.0 INSTRUCTIONS FOR SUBMISSION OF TENDER**  
**Qualification requirement**

Bidder shall have executed similar (Cabling & Conduiting) installation works of value Rs.20 lakhs in last two years.

Tender shall be filled in single stage two bid system. Techno-commercial and Pricebids shall be separately sealed and marked duly.

**Techno-commercial bid shall comprise the following**

1. EMD of value Rs.3.00 lakhs in the form of DD or Bank Guarantee in favour of ECIL, Hyderabad in a sealed envelope.
2. Latest IncomeTax Clearance Certificate and Permanent Account Number(PAN).
3. Deviations from tender, if any.
4. Terms & Conditions enclosed duly signed confirming acceptance.
5. Copy of the tender specification, each page duly signed in confirmation.
6. List of works executed in last two years along with proof of completion.
7. Documentary evidence in support of meeting qualification criterion.

**Price bid shall comprise the following**

Filled in schedule of quantities as per tender format.  
Taxes applicable shall be quoted extra.



**13.0 CONTRACT DELIVERY SCHEDULE**

The time period for completion of project is 12 months from date of LOI/PO. However, all efforts shall be put towards completing the work as per schedules given from time to time by ECIL/BHAVINI.

**14.0 QUANTITY VARIATION & PRICE VALIDITY**

The quantities indicated in the " Schedule of quantities " is tentative. The prices quoted shall remain firm for quantities upto +20% over and above the tendered quantities.

**15.0 SECURITY DEPOSIT**

The contractor has to submit security deposit for 10% of the value of the Purchase Order in the form of Bank Guarantee(BG) from any scheduled bank within one week from the release of LOI/PO. The validity of such BG shall be for the entire period of work including extended period if any.

**16.0 PAYMENT TERMS**

Progressive payments shall be made within 30 days on *prorata* basis at 90% of the work completed against submission of monthly running bills duly certified by the Project Manager.

Balance 10% shall be released at the end of the contract after the contractor has settled all dues with ECIL and all cost and claims by third party with respect to execution of this contract.

Income Tax, educational cess on IT and surcharge if any, and other statutory levy, if any on this contract as notified by Central / State Governments from time to time and recoverable by ECIL at the time of release of your bills shall be recovered from your running bills as well as final bill for this work.

**17.0 RISK PURCHASE**

In the event of failure of Contractor to comply with the tender/P.O. conditions, ECIL reserves the right to cancel the Order and proceed with an alternate source. In such case, the Contractor shall have to bear the extra cost incurred by us which will be recovered from the contractor's available credit and security deposit.

**18.0 SUB-CONTRACT**

Contractor shall not be permitted to sub-contract the work, whole or in part.



Terms & conditions

Sl No	Title of the Clause	Description of the clause	Confirmation/ by tenderer
1	Medical expenses for workmen	To be arranged by the contractor including hospitalization of workmen/staff as required.	
2	Taxes and duties	Any taxes and duties as applicable (e.g. Service Tax, Work Contract Tax etc) shall be indicated clearly in the price bid. For payment of Service Tax, Service Tax Registration Number must be furnished.	
3	Subcontracting	Subcontracting of any part or whole of work by the Contractor is not permitted.	
4	Safety procedure	The contractor should be well conversant with the SAFETY and other rules to be followed while working at the site. A copy of the Safety and other rules to be followed at site is available with Site-In charge, ECIL, Kudankulam site.	
5	Labour license	The contractor must obtain labour license to carryout the work. Necessary forms from Principal Employer shall be arranged by ECIL on application. The contractor shall comply with the provision of Payment of Wages Act, 1936. The minimum Wages Act, 1948. The employees' liability Act, 1938. The Workman's compensation Act, 1923. The Industrial Disputes Act, 1952. The Contract Labour (Regulation & Abolition) Act, 1970, and/or any modifications there of or any other law related, rules from there under from time to time.	
6	Quality Standards:	As the work is to be carried out meeting the quality standards the manpower deployed by the contractor should be adequately qualified and experienced. They shall be qualified by ECIL/BHAVINI prior to deployment at work.	
7	Safety appliances	The contractor must provide to his manpower deployed, all the safety equipment like helmets, safety shoes etc. and he should make necessary first aid arrangements at work spot.	
8	Equipment/ Tools/Consumables	Consumables : Saddles, clamps, rawl plugs (for clamping of cables on walls) only shall be issued by ECIL free of cost. All other consumables and tools necessary for carrying out works are in the scope of contractor. All test equipment for continuity and IR checks duly calibrated shall be arranged by Contractor.	
9	Overtime (weekly extended hours/ Sunday & holidays)	Since the work has to be carried out with an object of meeting the schedules of the Project, working of contractors' manpower on overtime shall also be needed. The contractor shall cooperate with ECIL in this regard for execution of jobs well in time by deployment of manpower on extended hours as and when necessary.	
10	Housekeeping	The contractor shall all times keep the site free from the accumulation of scrap and debris.	
11	Accommodation, Transport etc.	The contractor has to make his own arrangements for accommodation, transport, medical, sanitary and canteen facilities etc for his manpower.	



12	Payment to Manpower	The contractor has to make the payment to his manpower monthly in presence of ECIL's representative. In case of any default of payment to workers for the reasons attributable to the contractor, ECIL will have the authority to make payment to workers / manpower based on the available records from the outstanding payments of the contractor.
13	ESI & PF Registration	The contractor shall arrange for ESI and PF registration for the manpower deployed by him.
14	Handling of equipment:	All the jobs entrusted to the contractor shall be executed without any loss or damage to the material or equipment or installation of ECIL/BHAVINI. Cost of any damage or losses caused due to negligence or due to any act of fraudulent means shall be decided by the competent authority of ECIL and shall be final and binding on the contractor and such cost shall be borne by the contractor. ECIL shall have the right to deduct such cost from the monthly bills payable to the contractor.
15	Penalty for safety violation	From contractor pending bills, Rs 500/- will be deducted for each safety violation by his (contractor) manpower after giving two warnings by authorized representative of ECIL.
16	Recovery of Income Tax, etc.	Statutory tax deduction at source shall be applicable for all payments made to the contractor. The contractor has to submit the latest Income Tax Clearance Certificate and Permanent Income Tax Account Number (PAN).
17	Contractor All Risk insurance, workmen compensation policy	Contractor shall take All Risk insurance policy for Rs.5,00,000(Rs. Five lakhs only). The insurance policy shall be kept alive for the entire period till the work is completed under this contract. The contractor has to maintain workman compensation policy covering all his manpower. These insurance policies shall be submitted immediately on the commencement of work
18	Authorized Representative:	The contractor is required to communicate the name of the authorized representative(s) holding valid power of attorney duly executed under seal of the company on a stamp paper of appropriate value in the presence of a notary of the area. The person(s) so authorized shall be responsible for execution of the work and shall take necessary instructions from the Site In charge or his representative regarding work from time to time and deal all the contractual matters.
19	Validity of the Prices and quantity variation	The prices quoted by the contractor shall be firm during the currency of the contract. The contractor will not be allowed any escalation during the above period and the rates quoted by contractor shall remain firm during the above period for quantities up to +20% over and above the tendered quantities.
20	Security Deposit:	The contractor has to submit security deposit for 10% of the value of the Purchase Order in the form of Bank Guarantee (BG) from scheduled bank within one week from the release of LOI. The validity of such BG shall be for the entire period of contract including extended period if any.



21	Time period.	The time is the essence of the contract; the contractor must mobilize adequate resources for completion of job as per compressed delivery schedules that could be framed from time to time.
22	Risk Purchase	Upon failure of the Contractor to meet the delivery schedules / dynamic targets, ECIL will get the work done by others with charges to contractor's account and the contractor will liable to forfeit the security deposit.
23	Maintenance of records /log books/registers etc.	The contractor under the instructions of the Site-In charge or his authorized representative should maintain required registers/ log books/records as per labour laws.
24	Special tools, tackles, equipment and Manpower.	During execution, there may be requirement of special tools, tackles, equipment and manpower. The contractor should be able to meet such demand under the instructions of the Project Manger. In such cases, the contractor should mobilize his resources/manpower within 3 to 5 days of days of intimation.
25	Division of manpower	The manpower deployed under this order should be exclusively work for the jobs under this order only at site.
26	Deployment of manpower in more than one shift.	Whenever the job demands, under the instructions of the Project Manager or authorized representative of ECIL the contractor should deploy manpower in two or three shifts.
27	Furniture requirement	No furniture will be provided to the contractor and his man power deployed.
28	Planning & Execution	The contractor is responsible for proper planning as per the requirement given by the Site In charge, ECIL and timely and safe execution of job and establishment of right quality of the job. For this the contractor has to deploy appropriate professionals at site.
29	Fitter/Welder	Tradesmen of all categories must posses ITI in their respective trades with relevant experience.
30	Safety of the manpower deployed	The contractor will be responsible for the safety of the manpower deployed by the contractor. In case of accident, injury to the personnel while working, it is the responsibility of the contractor to arrange the medical treatment, compensation etc. or other facilities to his manpower.
31	Material reconciliation	The contractor shall be responsible for proper accounting of free issue material issued to him for execution of job. Value of shortfall material shall be recovered from the running bills.
32	Record of Gate Passes / Entry Permits for contractor's manpower	The gate passes issued to the contractor's manpower under this contract should be exclusively used for ECIL jobs. Passes issued to contractor's personnel who are not working shall be immediately deposited back to CISF through ECIL. Contractor shall at all times keep up to date record of all issued and returned gate passes.
33	Co-ordination with ECIL	The contractor should have sufficient Engineers/Supervisors (as per the instructions of Site In charge, ECIL) of his own to manage, coordinate and organize the contractor's manpower along with tools/equipment at site.



34	ECIL/BHAVINI QA Clearance	For all the jobs done by contractor, it is the responsibility of the contractor's QC Engineer to do inspection. The contractor has to generate checklist/inspection reports, which shall be verified by ECIL/BHAVINI QA. Works cleared by ECIL/BHAVINI only shall qualify for payment.
35	Guidelines for carrying work and observing safety standards.	All the jobs under contract should be carried out in accordance with the detailed work procedures, which shall be supplied before commencement of work. During execution of job, safety standards shall be strictly observed.
36	Mobilization of Manpower/ Resources	The contractor should be geared-up to mobilize his resources/manpower for the job within Fifteen Days of placement of LOI/Purchase Order on successful tenderer.
37	Discrepancy in the clauses	In case of discrepancy of any clause in Terms & conditions, Scope of Work or at any other reference, the stringent clause will be observed as per the discretion of ECIL.
38	Entry Permits	Contractor shall make arrangements at his own cost for issue of entry permits by CISF. Contractor shall verify the credentials of persons before engaging them at work. ECIL shall forward applications only after scrutiny. Police Verification Certificate for each person is a must.
39	Bonus/terminal benefits to workmen	Contractor shall pay min. one-month wages as yearly bonus at his own cost. Contractor shall pay terminal benefits of min. one-month wages to workmen on retrenchment at his own cost.
40	Indemnity bond	Contractor shall submit an indemnity bond indemnifying ECIL against any financial, employment or any other liability with respect to the workmen deployed by him for carrying out the job.





**QAP AND CHECKLIST FOR LAYING AND TERMINATION OF MI CABLES**

SL NO.	ACTIVITY DESCRIPTION	TYPE OF CHECK	AGENCY & EXTENT OF CHECK		REMARKS
			CONTR. QA	ECIL QA	
1.0	<b>MATERIAL</b>				
1.1	Check for accepted and identified materials	Verification	V	----	
1.2	Check for damage to drums/cables during transit and IR check	Visual / Measurement	H	V*	
1.3	Ensure cable end is sealed after inspection	Visual	V	----	
2.0	<b>QUALIFICATION OF MANPOWER</b>				
2.1	Check for qualification of Electrician for MI cable laying and termination	Verification	H	H	
3.0	<b>PRE ERECTION</b>				
3.1	Check for availability of cable tray route, supports and both end termination points	Verification	----	----	
3.2	Check for insulation resistance of cable (should be greater than 100Mohms) at 500 VDC. If insulation resistance is less than 100 Mohms, improve it by heating	Measurement	H	W*	
3.3	Check for continuity of each core and sheath	Verification	H	W*	
3.4	Check for end sealing of MI cable after meggering / heating	Verification	W	W*	
4.0	<b>TRANSFER TO SITE</b>				
4.1	Transport MI cables carefully in drums or cut pieces by covering with polythene sheet	Verification	W	----	
4.2	Check for any scratch and damage to cable	Verification	V	----	
5.0	<b>LAYING AND TERMINATION</b>				
5.1	Cable drums are placed on jack at suitable location for laying of cables	Visual	W	----	
5.2	Bending radius of the MI cable should be limited to a min. of six times the diameter of the bare copper cable	Measurement	W	W*	
5.3	Cable is cut in adequate length for end termination	Visual	W	----	
5.4	Check for cable laid as per cable schedule	Visual	----	----	
5.5	Cables shall routed on walls, columns and in light channel trays and clamped at	Visual	H	----	



intervals as recommended

5.6	Check for cable protection cover after laying of MI cables specially near walkways and equipment movement areas	Visual	W	----
5.7	Cable dressed and arranged properly on trays to avoid criss crossing of cables	Visual	H	----
5.8	Check for firm clamping after laying of cable	Visual	W	W*
5.9	Check to ensure cable is bent only with hand ad pyro bender	Visual	W	-
5.10	Check for about 300mm extra length in the form of loop at the instrument/ equipment end	Visual	W	-
5.11	Check fro Aluminum Tag plates	Corelation with drawing/cable schedule	W	W*
5.12	Check for segregation pf safety and non-safety cables	Corelation with drawing	W	W*
5.13	Check for proper glanding and tightness of gland	Visual	H	W*
5.14	Check for proper sealing after termination	Visual	H	W*
5.15	Check for continuity and IR value after termination	Visual	W	W*





QAP AND CHECKLIST FOR LAYING OF CONTROL CABLES AND GLANDING

SL NO.	ACTIVITY DESCRIPTION	TYPE OF CHECK	AGENCY & EXTENT OF CHECK		REMARKS
			CONTR. QA	ECIL QA	
1.0	<b>MATERIAL</b>				
1.1	Check for accepted and identified materials	Verification	V	----	
1.2	Check for damage to drums/cables during transit and IR check	Visual / Measurement	V	V*	
1.3	Ensure cable end is sealed after inspection	Visual	V	----	
2.0	<b>QUALIFICATION OF MANPOWER</b>				
2.1	Check for qualified Electrician for Laying, glanding and termination	Tests	H	H	
3.0	<b>UNLOADING &amp; STORAGE OF MATERIALS</b>				
3.1	For manual unloading of cables from truck/trailer				
a	Check for proper ramp for rolling of cable drum	Visual	W	----	
b	Check for placing of proper stoppers	Visual	W	----	
c	Check for proper unloading by use of crane	Visual	W	----	
d	Cable drums stacked properly to avoid accidental rolling of the drums	Visual	W	V*	
e	Cable drums labeled and tagged properly for easy identification	Visual	W	V*	
f	Check the drums are stacked in a dry area & covered with polythene sheet	Visual	W	V*	
4.0	<b>PRE-ERECTION</b>				
4.1	Check for route readiness	Verification	----	----	
4.2	Check for proper colour code marking on light channels / conduit to be followed during cable laying	Visual	V	----	
4.3	Check for proper maintenance of Drum card	Verification	V	----	
4.4	Check IR and continuity of cable drum while cutting the cable for laying	Measurement	H	W*	
5.0	<b>LAYING AND GLANDING OF CONTROL CABLES</b>				
5.1	Check for cable route length before cable cutting and laying	Visual	W	----	
5.2	Cable drums are placed on jack at suitable location for laying of cables	Visual	W	----	



5.3	Check for proper rolling of drum during cable pulling out from the drum	Visual	W	W*
5.4	Unarmoured cable should be laid through covered light channel or conduit from instrument to JB. Conduit dia. should be at least twice the cable dia.	Visual	W	W*
5.5	Bending radius of the cable should be minimum 12D for unarmoured cable and 15D for armoured cable where D is the outer dia. of the cable	Measurement	W	W*
5.6	Check that co-axial cables are not pulled in cable pan but put gently inside cable pan / trays	Visual	W	W*
5.7	Check for proper routing of cable through Instrument Cable Pan (ICP) where ever applicable	Visual	W	W*
5.8	Cable is cut in adequate length for end termination	Visual	H	W*
5.9	Cable dressed and arranged properly on trays to avoid criss crossing of cables	Visual	W	W*
5.10	Check for Power and Control cables laid through separate conduits / cable pans. Safety related and nonsafety related cables are not laid through same path, minimum separation distance to be followed	Visual	W	W*
5.11	Cables provided with Aluminum tags at regular intervals of 30mts and at exit/entry of wall, floor area and at termination ends as per cable schedules/specification and tied with PVC sleeves	Correlation with drawing/cable schedule	W	W*
5.12	Cable entry to JB / panel should be normally bottom end. (For JB side entry for exceptional cases)	Correlation with drawing	W	W*
5.13	Check for proper cable glanding with Double compression nickel plated brass glands	Visual	W	----
5.14	Check for separated glanding of power and signal cables in the same panels at different locations of gland plates	Visual	W	----
5.15	Check for proper loop of cable at the instrument end before glanding	Visual	H	----
5.16	Check for proper secure of cable glands to the JB / panels by locknut and neoprene rubber gaskets	Measurement	V	----
5.17	Check for insulation resistance (IR) value and continuity after glanding on each length of cable	Visual	V	----
5.18	Check for all cable screens are earthed at one point only	Visual	V	----





QA PLAN FOR LAYING OF GI CONDUITS

SL NO.	ACTIVITY DESCRIPTION	TYPE OF CHECK	AGENCY & EXTENT OF CHECK		REMARKS
			CONTR. QA	ECIL QA	
1	<u>MATERIAL</u>				
1.1	Check for accepted and identified materials	Verifications	V	----	
1.2	Draw required quantity of conduits for field use	Verifications	V	----	
1.3	Check for damage to conduits/pipes and galvanizing in transit	Visual	V	V*	
1.4	Check for dimensional conformity	Visual/Measurement	V	V*	
2	<u>QUALIFICATION OF MANPOWER</u>				
2.1	Check for qualified fitter for conduit laying	Verifications	H	H	
3	<u>LOADING, SHIFTING AND UNLOADING AT SITE</u>				
3.1	Check for proper loading in the vehicle and transport	Visual	W	----	
3.2	Check for proper unloading at erection site and stacking	Visual	W	----	
4	<u>PRE ERECTION</u>				
4.1	Check for Route and location Clearance	Visual	----	----	
4.2	Check for availability & condition of bending / threading machine	Visual	V	----	
4.3	Check for sharp edges and cutting burrs	Visual	V	----	
5	<u>ERECTION</u>				
5.1	Check for proper marking of routes	Visual / Measurement	W	----	
5.2	Check for location of JB, panels and Instrument	Visual / Measurement	----	----	
5.3	Check for size of conduits	Visual / Measurement	W	W*	
5.4	Check for aluminum / silver paints on fabricated or exposed threads	Visual	H	----	
5.5	Check for proper bending of conduits	Measurement	W	W*	
5.6	Check for proper fixing of saddles / clamping of conduit at an interval of min. 1mtr.	Visual / Measurement	H	----	



