

SOUTH EAST CENTRAL RAILWAY

TECHNICAL CONDITIONS OF CONTRACT

The following instructions are part of the tender & must be ensured by the tenderer.

A. ELECTRONIC INTERLOCKING

1. For the new EI, it should cover all aspects & items as required in the schedule for successful working & commissioning as per the laid guidelines & practices of railway. All the required items shall be supplied & installed by the contractor.
2. The inspection authority for the electronics parts & any other critical parts of the EI should be RDSO, and for the rest miscellaneous items it will be consignee as per the existing practice of SECR. In case of doubt the decision of the Railway will be the final for finalization of inspecting agency.
3. The Electronic Interlocking System or parts or cards etc. supplied shall have the approval of RDSO as per specification no. RDSO/SPN/192/2005 or with the latest amendment.
4. The Electronic Interlocking System shall be complete with power supply arrangement, networking & communication arrangements, all the necessary and recommended protection devices for lightning and surge protection.
5. The Tenderer must comply with all requirements of RDSO TAN 3004, 3006, 3007, 3008, 3012, Security TAN, TSAA guidelines issued by the RDSO & SECR HQ up to the latest amendments.
6. The tenderer along with OEM must prepare and submit all the necessary drawings, documents, TAN/RDSO/HQ policy compliance paper etc. & application paper for the TSAA approval.
7. Tenderer shall ensure that the installation of Electronic Interlocking System equipment shall be done by manufacturer of the equipment/their authorized technical staff.
8. Necessary technical documents, installation & maintenance manuals, troubleshooting procedure details and any other required technical information regarding the Electronic Interlocking System supplied shall be provided one set for each station.
9. Any minor alteration/modification if required (without changing the scope of work) which improve safety/security or as per Railway board/RDSO/CRS/GM/PCSTE instruction/sanction during the course execution of work shall be carried out by the Tenderer expeditiously without any extra cost.
10. EI trouble shooting charts on vinyl board should be provided inside the EI room along with the code interpretation manual. Similarly, communication diagram clearly indicating each connection should be made on a vinyl board.
11. Audio visual alarm should be provided if OFC breaks, or switch gets defective in providing communication between distributed EI. The same to be monitored via datalogger.
12. Bit chart of appropriate size should be fixed in front of new/old EI rack.
13. All relays, Racks, equipment etc. should be properly named & writing work must be proper.

14. 2X48 F OFC cable will be laid either direction of track for path diversity. The same cable may be utilized for EI, MSDAC, datalogger etc.
15. OFC & Power supply for A & B system to be taken independently to each VDU and need to be terminated underneath each VDU on separate counter/FMS as per SECR Policy.
16. Boolean equations of the modified logic shall be submitted for comparison and approval with the existing application logic by Railway. Similarly, I/O bits and port configuration shall be submitted for approval by Railway. Required Application Data Generation tools shall be made available to the Railway along with a comparative statement of modified logic with existing logic.
17. Steel perforated tray of suitable width and minimum 5 mm thick, or any other metal tray which looks homogeneous to the EI racks in color & strength, or any tray approved by railway should be used as cable tray. It should be complemented with PVC ducts for insulation & segregation of different wires/cables. The steel/metal tray should be connected to earth. All the sharp edges to be insulated & unsharpened with PVC/rubber materials and gaskets. Proper nomenclature of the trays must be done.
18. All the stands, fixtures etc. used for EI must be high quality Stainless steel.
19. After the commissioning the OEM staff should halt at site for minimum 72 Hrs for attending any abnormalities.
20. **To facilitate Kavach ready EI installations without requiring design & testing of EI when Kavach is installed at later. Provision of Kavach ready Interfaces in Electronic Interlocking is to be provided. Provision of dedicated port with allocation of Kavach bits shall be ensured for Kavach interface as per Railway Board Letter No.- No. 2018/Sig/18/ EI/Gen. New Delhi, dated 04.09.2024 & RDSO Letter No: RDSO-SIGOMISC(GEN)/1/2021Part(1) Date: 17.08.2024.**

B. IPS/MINI IPS/ALTERATION IN IPS:

1. The supply & execution of IPS/Mini IPS should comply RDSO letter No STS/E/IPS/Genl dated:03.04.2008.
2. Power supply distribution diagram which indicates each module of IPS needs to be provided on vinyl board for ease of troubleshooting in IPS room.
3. Main and standby power supply should have different fuses.
4. Ensure insulation of IPS & connecting ladders from ground & walls.
5. Ladders of power cables should be insulated from walls.
6. RDSO's guideline shall be followed for Earthing and lightning protection.
7. SMR/DC-DC Converters transformers module of IPS should be monitoring through Datalogger. Its wiring must be done by the Tenderer. SMR AC o/p also to be monitored by datalogger.
8. Surge arrestors should be provided for new IPS/Mini IPS.
9. Main and standby power cables should be connected to different terminals of IPS.
10. Only multi strand copper wire of suitable gauge must be used from CLS panel to IPS & IPS to EI/Relay room/VDU supply. No aluminium or signal cable to be used.

C. RELAY ROOM/SM ROOM:

1. Availability of proximity switches on doors must be incorporated in Datalogger.
2. Proper nomenclature of relays, terminals etc. is to be done.
3. All wires/cables should be bunched properly. The lacing and dressing for telephones and other S&T equipment should be done properly.
4. Fuses are of standard rating to be provided.
5. All the equipment must be housed/grouted as per the approved floor plan. The contractor must prepare & submit the floor plan to railway for approval.

D. DATALOGGERS:

1. Data-Loggers shall be connected to the main data-logger network of SECR.
2. Validation and networking of Datalogger needs to be ensured prior to commissioning. All test operations to be recorded in Datalogger.
3. EI's clock and Datalogger clock through CMU must be synchronized.
4. Closing of doors of Relay rooms and Goomties shall be monitored through data-logger.
5. Both AT inputs and selected output of CLS Panels at IBH/LC/Auto goomties shall be monitored by adjacent SM through VDU & in Datalogger. The necessary wiring shall be done by the Tenderer at no additional cost.
6. Datalogger to be connected to earth.

E. LC GATE:

1. All the foundation must be done according to IRSEM & IRSOD with latest updates.
2. Provision of proper quality of retro-reflective strips to the new LC booms.
3. Kaycee makes or similar heavy duty (4NO/4NC) switches with parallel contacts to be provided in LC gate panel.
4. All cables of pedestal lock post & operating panel to be earthed.
5. Lock post, Pedestal, sliding boom must be connected to rail earth. All the necessary connectivity/wiring/drilling etc. & materials like GI strip etc. shall be done or supplied by the Tenderer at no additional cost.
6. All the old materials of the LC gate must be dismantled and removed from site to store or for disposal.

F. EARTHING:

1. Earthing of location boxes and signal posts should be done using 8 SWG wire wrapped on MS plate connected at one end to location box and other with earth pit.
2. Both Sheath & Armor of Main cables are to be earthed. All cable armor shall be soldered with released cable copper conductors of required length & the armor to be bent (like flower) and tightened with GI clip and the other end of the conductors shall be connected to Cable gland plate. Armor of OFC shall be earthed at both ends.
3. All the necessary connectivity/wiring/drilling etc. & materials like GI strip etc. shall be done or supplied by the Tenderer at no additional cost.
4. Earth enclosures with covers should be provided & painted properly. Its earth value should also be mentioned in it.

5. When more than one earth is being made for preparing a ring earth, value of each earth needs to be recorded before allowing inter-connection between the earths.
6. In the ring earth & BRC if multiple wire/cables are to be exothermically welded then they should not form a cluster, meaning all the wire/cable should be welded at separate location.
7. All earthing values should be jointly checked with open-line staff.

G. LOCATION BOX:

1. Rubber paint should be provided at the bottom as per SECR's Policy.
2. Proper fixing and provision of at least 03 nut-bolts at either side with spring washer & check nut should be ensured for hylum sheet.
3. Cut-in relays should be provided on powder coated Patti with at least 02 nut-bolts on either side with spring washer & check nut.
4. Location Box should be fitted properly with foundation bolts.
5. Inside wiring, equipment fixing, cable terminations should be in order.
6. Sand filling & plastering of location boxes should be done.
7. Lamps with switches should also be provided in location boxes to facilitate rectification in case of exigencies at night. All the necessary wiring/drilling etc. & materials shall be done or supplied by the Tenderer at no additional cost.
8. Proper soldering of cable armor in location boxes to be ensured.
9. High voltage terminals should be covered with PVC transparent cover.
10. Outdoor cables shall be generally kept tied and dressed at the backside of the terminal board, supported on suitable string rod, which shall be supplied by Tenderer.
11. All the cable armor must be connected to earth with soldering and clamps.
12. All the foundation must be done according to IRSEM & IRSOD with the latest updates.
13. For alteration work the new cable must be inserted from bottom of the foundation or designated pipes/duct in the foundation.
14. All the old Location boxes must be dismantled and removed from site to store or for disposal.

H. SIGNALS:

1. Distance from track center should be painted on signal base.
2. The Tenderer shall provide wooden cross of approved type for the newly erected signals till they are commissioned. The crossbar should be painted white as per IRSEM and fixed with suitable MS flat clamp.
3. Gasket should be provided on all new Signal unit.
4. All the necessary markers & nomenclature of the signal must be provided.
5. In Case of signals with horizontal clearance less than 2.36 meters from the nearest track center, blanking arrangement shall be provided as per IRSOD & IRSEM. The ladder of the signal shall be blanked off to a height of 300 mm between 2060 mm and 2360mm above rail level using MS plate not less than 8 mm thickness. The end portions of the plate shall be rounded off and no sharp edges shall be protruding.

6. Signal aspects wherever required to be blanked shall be done as per instruction of Engineer in-charge of the work. All the unused holes for LEDs should be covered with metal plates.
7. The height of the signal post shall be adjusted as per the decision of the site in charge regarding height of signals shall be final and binding on the Tenderer and the length of the post shall be cut if required by site in charge.
8. A ladder shall be fitted to the signal post. The ladder base shall be fixed with GI base in the ground and legs shall be embedded in concrete to be supplied by Tenderer.
9. In the RE area which are coming in the infringing zone, screening arrangement made of MS wire-mesh shall be provided.
10. All the foundation must be done according to IRSEM & IRSOD with the latest updates.
11. For alteration work the new cable must be inserted from bottom of the foundation or designated pipes/duct in the foundation.
12. All the old Signals must be dismantled and removed from site to store or for disposal.

I. TRACK CIRCUITS:

1. Double lead wires/bond wires should be provided.
2. Traction Bonding should be fitted properly & as per plan. Transverse bonds and continuity bonds shall be provided with double wires/wire ropes.
3. Batteries to be placed on wooden platform in location boxes.
4. PPTC fuse to be provided at feed end.
5. Track chargers should have potential free contacts for monitoring through Data-logger.
6. All the old materials must be dismantled and removed from site to store or for disposal.

J. CABLE LAYING:

1. Cable shall be laid as per approved cable route plan and cable core / distribution plan. An extra cable loop of 6 to 8 meters shall be kept at each end at apparatus cases, at signal foundations, ABS huts / Relay rooms, major bridges, and culverts.
2. For cable laying SECR Policy Circular: 02/2022 Date: 25.01.2022 strictly to be followed. All the necessary documents mentioned in the policy must be arranged by the Tenderer or prepared by the Tenderer & to be submitted to railway for approval if required.
3. The entire cable path shall be provided with cable route markers at regular intervals. Additional cable markers shall also be provided at every cable joint/cable diversion/Track Crossings. Cable markers shall be painted with standard color code.
4. If the provision of RFID Cable route markers is available in the tender schedules, it must be provided in the duct / trench during cable laying & before backfilling the trench. It shall be provided at regular interval, at the locations of Track crossing, OFC Loop Chambers and OFC Joint chambers or other cable joints.
5. Cable laying should commence only after the depths and quality of trenches have been checked jointly by the Engineer's representative and Tenderer's representative.
6. Trenching for track crossing and laying of cable across the track should be done only in the presence of the Engineer's representative.
7. In case water comes out in the trench during digging or cable laying or otherwise, it shall be evacuated by Tenderer using exhaust pumps to throw water outside the trench, so that

work is not affected on this account. All machinery for doing this shall be arranged by the Tenderer at his/her cost.

8. Surface of the road, buildings and platforms shall be restored to original condition after cable laying.
9. All Signaling/Telecom cables are to be meggered/looped tested (or OTDR report in case of OFC) as per Manual once before laying.
10. After laying again the cable must be meggered/looped tested (or OTDR report in case of OFC) jointly with open line & report is to be prepared in the standard format register of SECR, which needs to be supplied by the Tenderer at no additional cost.
11. If any of the testing parameters of the cable is found below permissible limit after refilling the cable trench and during the transportation of the U/G cable, the said cable must be replaced or repaired by the Tenderer at his own cost.
12. Cable drum shall be mounted on jacks and cable taken out by turning the drum. In no case cable shall be pulled out. Cable so unwound shall be laid out by carrying on laborer's shoulder. Enough people shall be deployed for this purpose.
13. Both ends of every core of underground cable (used or spare) shall be terminated in the respective terminal boards and at the functions as per approved termination diagrams and circuit diagrams.
14. The trench path shall be straight as far as possible. The trenching shall be carried out without causing damage to the working cables and utilities. A qualified engineer shall be deployed at the work spot continuously.
15. If any cables or utilities are damaged during digging of cable trench or any other activity, the same shall be repaired and restored to working condition immediately.
16. Laying of HDPE duct and blowing of OFC Cable & splicing/jointing shall be done as per guidelines given in IR Telecom Manual. OFC cable shall be blown through HDPE duct using a blowing machine and no manual pulling is permitted. Before blowing the OFC cable, Duct Integrity test shall be carried out on HDPE duct. After splicing, OFC shall be tested, and readings should be recorded jointly with railway officials.
17. Before taking any cabling work in the vicinity of existing cables, the existing cables must be identified with cable route tracer and the existing cable route is to be identified and marked with white powder to avoid its damage during excavation work. All these activities must be carried out by the tenderer.
18. Even after the cables are laid and refilled and on Account payments are made to the Tenderer, the security of the cables laid and other Associated equipment solely lies with Tenderer, and he must replace the same at his own cost if any, theft or loss or damage occurs till the station/section is commissioned to the complete satisfaction of Railway and the same is handed over to the Railways.

K. RELAY/CABLE TERMINATIO RACKS, FUSES AND TERMINALS:

1. The Tenderer shall complete related masonry works and relay racks fixed on ground/walls by drilling holes, walls/floor shall not be broken. Fixing of relay rack with frame shall be done as per instruction of Engineer-in-charge of the work.

2. Relay racks should be fitted with relay base plates. Inter rack wiring should be arranged directly from rack to rack or IDF depending on the type of arrangement.
3. The bunch of wires connected to relays etc. shall be kept together using cable ties.
4. Other than relay bases, all multi-strand wires shall be terminated using proper lugs and crimping tools.
5. All relays shall be provided with description names painted.
6. All the cables shall be inserted preferably in between the space of the CTR from the flooring and should be routed through PVC cable tray duct at back of CTR.
7. High voltage terminals should be covered with PVC transparent cover.

L. CLS PANEL:

1. All input power supply must be monitored via datalogger. Necessary accessories must be procured & installed by the Tenderer.
2. Proper nomenclature of all input and output supply, indications, button/switches etc. to be done.
3. Multi strand copper wire of suitable gauge should be used to connect the IP from CLS. The connection to be made in double (one main and other standby).
4. All the entry & exit cables to CLS to be properly routed through the GI pipe or any other pipe as decided by railway to the CLS.
5. Electrical wiring inside the panel should not be haphazard. All cables/wires should be dressed properly inside CLS panel.

M. ELD:

1. All the newly laid cable (or any other cable if advised by railway) should be connected with ELD.
2. ELDs Earth terminals are to be connected at two separate points on BRC.
3. PF contacts of ELDs to be wired in datalogger and efficacy thereof to be monitored routinely.

N. WRITING WORK

1. All the writing work should be done as per the railway board policy No 2023/Sig/17-Sig Equip/Maintenance/Part Dated 06.11.2023.

O. DOCUMENTATION:

1. The Tenderer must submit all the necessary diagrams to railway for approval along with the auto-CAD file. While checking if any correction is required the Tenderer must submit the correction copies to railways.
2. After the approval of diagram, The Tenderer must make available a copy of the approved diagram & digital scan copy of the approved diagram to railway and can take one copy for working at site. No extra payment will be made for that purpose.
3. After approval of the completion diagram a set of digital copies of the approved completion diagram must be submitted by the Tenderer. No extra payment will be made for that purpose.

4. The design, documents & circuits etc. shall be designed & checked by IRSE / IRSTELO design license holders before submitting to railway for approval. To have continuity in the design process designers shall not normally be changed for the entire project duration.
5. The Tenderer shall prepare a cable route plan as soon as the LOA is issued with a joint survey with the railway. The survey report shall be prepared in a diagrammatic representation, showing the existing cable paths, distances of various cable paths from the nearest track center, railway land boundary etc. The cable paths shall be preferably planned nearest to the railway boundary.
6. All the grouting of the equipment must be done as per the approved floor plan. The contractor should prepare the floor plan and must submit it to railway for approval.
7. It is to note that in case of change in the policy of SECR or project unit regarding the drawings the new policy will prevail.

P. TESTING & COMMISSIONING

1. The Tenderer must perform all the necessary tests of both indoor and outdoor installations of Signaling system along with all associated works individually and after integrating with the system for its full functionality to meet the requirements laid down in this contract, G&SR, IRSEM, IR Telecom Manual, Operating Manual and SECR Guidelines & practices.
2. All the critical tests i.e., bell test, i-FAT, functional test etc must be done by Tenderer/OEM & test documents must be submitted to the railway before offering the testing by Railway officials. The Testing is to be carried out by a Competent Engineer.
3. Signaling, power and telecommunication cables & OFC shall be merged/tested once before laying and again after laying. The test results shall be recorded as per the format given in IRSEM and IR Telecom Manual or as per SECR formats.
4. All earth pits shall be tested individually. Measurement of ring earth shall be carried out first for individual earth pits and after interconnecting all earth pits.
5. For any type of testing of the gears/equipment/cables etc. including FAT/SAT, all necessary arrangement & logistics for the officials conducting the test, sitting arrangement, refreshment arrangement, all necessary tools & machinery etc. must be facilitated by the Tenderer on its own cost.
6. Equipment such as EI, MSDAC, UFSBI / mux, IPS, Datalogger, Class A protection, Ring earth etc. shall be installed, wired, tested, and commissioned by OEM's authorized engineer only. Pre-commissioning checklists shall be signed and OEM certificates for satisfactory installation shall be issued for all equipment.
7. **Electronic interlocking:**
 - a. Comparative statement of Application Logic between old logic & new FAT/SAT version and Service Version duly certified by OEM shall be submitted to Railway for scrutiny.
 - b. The Tenderer must facilitate all testing of EI like FAT, SAT or any other. It is solely the responsibility of the Tenderer to arrange & set up the testing bench with all

necessary accessories like VDU, PC etc. The setup may be temporary or permanent as decided by the railway. The material shall be issued & returned to the store by the Tenderer on his own account.

8. The Railway shall provide Power/Traffic Blocks, NI or S&T Disconnections, or all, during day or night to enable the Tenderer to execute the construction works related to existing live/functional equipment, or such other work as may be determined by the Railway Engineer. The Tenderer must execute the construction work within the block/NI/disconnection period. All the work should be finished & tested within that time only. For that:
 - a. All the pre work must be completed before NI or disconnection to the satisfactory of railway engineer for the successful working of the system.
 - b. The tenderer should provide all manpower & machinery including teams of indoor & outdoor wireman, fitter, labor, night gang etc. which are necessary for the successful & timely commissioning of the work and as per the approved plan.
 - c. All the Indoor & Outdoor Wiring diagrams as build approved copy, Contact Analysis, Fuse distribution chart, Wire counts details, Cable Route Plan, floor plan, Cable termination plan and location box particular, Cable Corage Plan, Power supply arrangement plan, Track circuit bonding plan, Joint testing records of cables meggering, equipment, earthing, battery charging , points, FAT, SAT report with cross sheet testing, signal implantation reports of new signals and any other drawing (as built approved copy) as prescribed and verified & checked (bell-test etc.) jointly by Railway and Tenderer/ OEM must be available before NI at the site. The Tenderer must plan their activity such as making of drawing, submission to railways for approval etc. accordingly. The Tenderer is fully responsible for abiding this.

Q. TRAINING:

1. The tenderer must provide training to the railway personals for the operation & maintenance of the system, especially EI, UFSBI, IPS and all other high-end equipment. The tenderer must also train the railway officials about the daily operation of the system.
2. Training shall be imparted preferably at work site/Railway depot nominated by engineer in charge / manufacturer's premises.
3. The training scope shall also cover providing topic-wise material to trainees.
4. They shall train in all aspects of system design, engineering, inspection, testing, execution, commissioning, fault diagnosis operation and maintenance of the system as whole and all constituent equipment.
5. The Tenderer/ OEM shall supply all the tools, accessories & software for the requirements of checking, testing, installation, commissioning, alteration, fault rectification etc.
6. The Tenderers at every stage of installation, testing and commissioning shall provide all facilities for adequate training of Railway personnel who may be deputed to work on the project.