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Dy. Chief Signal & Telecom. Engineer,
Railway Electrification,
Ambala, Bhubaneswar, Chennai,
Danapur, Jaipur, Jabalpur,
Kolkata,Lucknow, Secunderabad and
New Jalpaiguri..
ASTE/ Ahmedabad

Sub: Policy Guidelines for making Signalling System suitable for 25 KV RE fit.

Policy Guidelines for making Signalling System suitable for 25 KV RE fit for new signaling installation & Modification (PI/EI/RRI) and while preparing detail estimate are given in the enclosed Annexure.

These guidelines are not exhaustive and suitable modification for any particular items may be incorporated based on Zonal Railway practices. Actual planning of execution should be done after drawing MOU with the Zonal Railway as per the prevalent practice on that Railway.

DA: As above.

(D.K.Singh)
Dy.CSTE (P&D)
for CSTE/CORE

Guidelines for making signalling system suitable for 25 KV RE fit

S.N	ITEMS
1	**Following field documents are required to be modified to suit 25 KV RE work at each station and approved by competent authority before commissioning of work. Ferro prints in sufficient nos. and tracing showing alterations of same need to be provided before opening (where applicable):**
i.	SIP, SWRD
ii.	SWR
iii	Selection table (RCC), Panel Diagram, Power Supply wiring diagram
iv	Infringements due to Signal Structures, Sighting Committee report
v	Relay rack arrangement diagram, CT rack termination diagrams, Fuse wiring .
vi	Cable core plan, Cable route plan, Cable meggering report.
vii	Location Diagram, Bonding diagram to suit single rail Track Circuit.
viii	Data logger contact details along with validation certificate.
ix	Circuit diagrams certifying continuity/break test and wiring. All alterations needs to be shown.
x	Diagrams of single and double line block instrument circuit.
xi	Diagrams showing connection of power supply.
xii	Singalling Asset History register/ details.
xiii	Safety Certificate, Assurance Certificate, Safety Message
xiv	OEM's Commissioning report of axle counter, IPS, Data logger and EI's if any. Compliance to RDSO's TANs wherever applicable
xv	CRS /CSTE sanction and safety certificate
xvi	Dispensation :-
a	As per GR. Para. 3.04 (1) Placing of Signal RHS.
b	As per GR Para 3.40 (1) (b) Taking off of Home Signal.
c	As per GR Para 3.07 (7) Combining of Signals.
xvii	Any other document (Pl. specify)

xviii	In case of RE Modification of existing PI, there should be an endorsement to be made in SIP & SWRD "Signalling installations suit to 25 KV AC" even when there is no alteration in the documents.
2	Power Supply & Indoor
i	The power supply from auxiliary transformers (ATs), local source and DG set (s) shall be brought and terminated at a power supply control panel in ASM's office/cabin or at LC gate as required. The power supply control panel shall be provided with the facilities for automatic change over between two ATs. In addition, manual change over facility shall also be provided in the control panel. The power supply control panel, cable (other than from DG room) and other associated arrangements shall be provided and maintained by Electrical Deptt. (RDSO Spec. No. TI/SPC/PSI/CLS/0020). (Para 16.2.1.6 of SEM Part-II)
ii	The supply from the power supply control panel as provided by Electrical Deptt. shall be taken to various S&T locations by S&T Deptt (Para 16.2.1.7 of SEM Part-II).
iii	The supply from the power supply control panel shall be extended through separate MCBs/Fuses to cabins, LC gates, telecom installations etc. if these are falling within two kms of power supply control panel. For location beyond two kms, a separate set of ATs and power supply control panel shall be provided. (Para 16.2.1.8 of SEM Part-II)
iv	In case of conventional power supply arrangement separate batteries shall be provided for external and internal circuits. If IPS is used for power supply arrangement then separate DC-DC converters shall be used for External and Internal supplies. Also in order to improve signaling reliability the external power supply shall be bifurcated for North zone and South zone or East zone and West Zone as per the local situation.
v	It shall be ensured that four no's of 230/110 V transformer of adequate capacity to be provided for feeding of signals - two no. for up and two no's for down side. Out of two no's in each side one should be used to feed signals located at a lower distance i.e. 600 m in double line and 500 m in single line and the other for feeding signals located at distances beyond. (Para 22.7.5 of SEM Part II)
vi	Provision of B&C class Surge protection on individual Power Supply .
vii	Earthing arrangements for power supply.

3	**Indoor Relay Room**
i	Separaion of 24 V external circuit on separate external 24 V wherever not there, that is cutting in relays, TPRs, ICC and Point detection circuit must work on 24 V external supply.
ii	Wiring alteration for cutting in relays, QSPA1 relay etc. First TPR should be QSPA1 type. Proving of contact of QSPA1 relay in UYR1/ UYR2 release circuit.
iii	Replacement of non AC immunised relay with AC immunised relay for followling circuit:
a	Point detection (NWKR/RWKR)
b	All ICC/ Slot circuit relays .
c	All Ist TPR relays
d	L. C. gate control relays.
iv	All EKT is to the replaced by suitable KLCR or AC immunised EKT.
4	**Panel Room**
i	Auto change over power panel & supply failure alarm.
ii	Provision of block filter circuit for all block instrument.
5	**Signals**
i	If the distance between signal and signal control relay is more than 180m(for single line section) and 220m(for double line section) then repeating relay should be used. (Para 22.7.4 of SEM Part-II).
ii	AC immunized cutting in/repeating relays shall be used in location boxes .
iii	Earthing of signals posts.
iv	Protection screen for signals infringing RE clearances (within 2 meters from OHE wire) should be used and earthed. (Para 22.14.2.1 vi) of SEM Part-II).
6	**Point**
i	In all metal to metal installation,AC immunized point group to be provided or WKR1or Wkr2 relays to be replaced by AC immunized relays.
ii	Point detection and Point detection repeat circuits shall use AC immunized relays. (Para 22.8.2.1 of SEM Part-II).
iii	All point machines are to be AC immunized. The permissible parallelism varies as per type of point machine and AC immunity level tolerence of the point machine as mentioned in (para 22.8.2.2 of SEM -II.)
7	**Track Circuit**
i	Staggering of polarity in track circuit should be done.

ii	Where Concrete sleepers are used. The length of track can be extended up to 450 meters when QTA2 track relays should be used.(para 22.10.4.5 of SEM -II.) as per practice of concerned Zonal Railways
iii	Where Concrete sleepers are used. The length of track can be extended up to 750 meters when QBAT relays & one 'B' type choke at the relay end can be used.(para 22.10.4.7 of SEM -II.)
iv	B' type choke in feed end as well as in relay end should be provided for all track circuit as per typical diagram. (Para No. 22.10.4.8 & 22.10.4.10 of SEM Part-II)
v	Bonding suitable for RE area eg.cross bond, continuity bond, structure bond and transverse bond should be provided. **The S&T department is responsible for the installation and maintenance of all rail joint bonds (Para 22.10.8.8.1 of SEM Part II). Where Rail bonds, Cross bonds, structure bond and transverse bond are required for traction return purposes they shall be installed by and remain the responsibillity of the electrical department. (Para 3.0 of APPENDIX-II of ACTM Vol-II Part-II).** Earthing of OHE mast at suitable interval in track circuited area to be provided by electrical deptt. Negative rail to be connected with OHE masts by Electrical department.
vi	Removal/Provision of glude joints.
vii	Change in bonding jumper to make single rail track circuit as per railway typical bonding plan.
viii	Augmentation of track battery if required.
ix	Along with track feed charger 03 cells of 2.2 v for QTA2 TR relay and 04 cells of 2.2 v for QBAT TR relay.
x	Wiring of track feed circuit arrangement as per typical applicable for RE area.
xi	**In RE area for single rail DC track circuit 80AH secondary cells shall be used. Track feed battery chargers for the 80 AH secondary cells shall be as per specification no. IRS:S-89/2013 or latest with current rating of 10A.**
8	**ICC/LC gate control /IBS/External**
i	All external circuit to be replaced with AC immunized relays and should work in double cutting arrangement.(Para No. 22.5.9 of SEM Part-II)
ii	Cutting in arrangement for relays of IBS/ siding etc.
iii	All IBS circuit of IBS to be transferred in Quad cable or otherwise cutting in arrangement to be provided.
iv	No polarized relay shall be used in any external circuit. (Para No. 22.5.7 of SEM Part-II)

9	**Cables & Laying:**
i	In the vicinity of traction sub stations and feeding posts, the cable shall be at least one metre away from any metallic part of the O.H.E and other equipment at the sub station, which is fixed on the ground, and at least one metre away from the sub station earthing. In addition, the cable shall be laid in concrete or heavy-duty HDPE pipes/ Split RCC pipes or other approved means for a length of 300 meters on either side of the feeding point. As far as possible, the cable shall be laid on the side of the track opposite to the feeding post.(Para No. 22.5.7 of SEM Part-II)
ii	Cables armouring to be earthed properly.
iii	**All GI pipes carrying cables running parallel to electrified track for a distance of more than 20 m but less than 350 m shall be connected to an earth or traction rail. If GI pipes with the nearest electrified track exceeds 350 m, all such exposed metallic parts shall be connected to a separate earth at distances not exceeding 350 m apart (Para 4.2 of APPENDIX-II of ACTM Vol-II Part-II) .**
iv	**Cable laying should be done as per RDSO guidelines on signalling cable laying Document No. RDSO/SI/G/2010 Version : 1.1 Date Effective: 04.02.2014 or latest**
10	**Earthing**
i	All earthing arrangement to be provided as per RE manual/SEM chapter 22.
ii	Each *main* signals, location boxes, cables armour, L.C. gates etc. are to be earthed. *Earthing of CT Boxes with tail cable is required if used for SSDAC, HADAC, etc.*
iii	Block circuits working on earth return through the respective block filters shall be earthed (Para No. 22.14.2.1 iv) of SEM Part-II)separately.
iv	**Suitable standard earthing shall be provided for all operating panel, power supply, switch board, transformers, inverters etc.**
v	**Limits of earth resistance: The maximum earth resistance specified is as below:**
a	**Earth for lightening discharger - 10 ohms (Para 22.14.2.3 of SEM Part-II)**
b	**Earth for equipment(other than electronic)- 10 ohms (Para 22.14.2.3 b) of SEM Part-II)**

c	**Electronic gears such as Axle counter, Datalogger, IPS, EI etc- 1 ohms(Para 22.14.2.3 c) of SEM Part-II)**
vi	A minimum distance of 3 m should be maintained between two earth electrodes. (Para 19.91 of SEM Part-II)
vii	The lever frame and other mettalic frame of the cabin shall be connected together to a separate earthing.(Para 22.14.2.1 i) of SEM Part-II)
11	**Rodding Run, Wire run (Machanical signals & LC gates)**
i	Operational end of all the rodding run and wire run should be insulated from functional end.
ii	Insulation joints to be provided in Rodding Run and wire run.
iii	If the distance between the insulators at either end is more than 300 meters , additional insulators shall be provided on each rodding, so that the distance between two consecutive insulators on the same rodding is not more than 300 meters.(Para 22.8.4.4of SEM Part-II)
12	*Power Supply & Indoor*
i	AT of adequate capacity should be provided at each station and **arrangement of AT supply should be made available at manned LC gate.**
ii	OHE mast need to staggered as per SEM details available on Drg No.22.8 & 22.9 for proper visibility of signals. (Para 22.3.3.1 & 22.3.5.1 of SEM Part-II)
iii	The change over panel in ASM office shall be kept in good working condition. Defects , if any, shall be promptly rectified.(para 16.11.1 of SEM-II.)
iv	Track bonding in AC traction area.
v	Bond should not touch cables GI pipes in any place in the yard
vi	Cable termination box of AT supply should be earthed separately.
13	**Block circuit**
i	Modified blok instrument along with approved type of filter unit suitable for 25 KV RE area shall be used and Block circuit shall be transferred into underground telecom cable.
ii	Separate line battery or DC-DC converter shall be used for each block instrument. This battery or DC-DC converter shall feed only the block instruments and not any other circuit.

iii	**Separate earth shall be provided for each Block Instrument at a station.(para 19.89 of SEM-II.)**
iv	**The surge arrestors provided in block.(para 22.14.2.1v) of SEM-II.)**
v	**Separate batteries shall be provided for Signalling and Telecommunication circuits.**
vi	Barring block-instrument circuits, no other earth-return circuit shall be permitted on A.C electrified territory. The Block instruments, however, shall be suitably protected by a filter of approved design as stipulated in para 22.9.52 of SEM-II. (para 22.5.2 of SEM-II).
14	**Where approved electronic time element relay are used , these shall be two in number and there contact shall be in series in the concerned time release circuits. (Para 21.10.2 of SEM Part-II).**
15	**Miscellaneous Items (Telecommunication)**
i	**TPC phones shall be provided at station and SP/ SSPs.**
ii	**All telephone circuits (except cabin to cabin, cabin to ASM, Cabin/ASM to LC gate within station limit, ASM to location, location to location and cabin to location circuit, which may be retained on signalling cable) shall be shifted to underground telecommunication cable (as for as possible, it should be shifted on quad cable).**
iii	**All overhead telecom alignment shall be shifted on cable as per the approved instructions.**
iv	**REPC clearance shall be obtained.**
v	**RE Cable Earthing: It is provided on metallic screen/armour of cables and equipments in VF repeater Stations/cable huts to afford safety to personnel against shock and protect equipment against surges & high voltages and to limit the induced voltages to safe value.**
vi	**Limits of Earth Resistances for :** **i) Surge arrestors/lightning dischargers of Telecom. equipment - Not more than 10 ohms** **ii) Screen/Armour of Aluminium sheathed Telecom. Cable - Not more than 1 ohm.** **iii) Equipment earth in VF repeater stations,Cable huts and way stations - Not more than 5 ohms**

vii	Emergency control telephone posts and sockets shall be provided at correct regular intervals along the track electrified area as per the approved instruction.
viii	The metallic cabinet cover / frames of telecommunication equipments shall be earthed properly.
ix	PA System Modification shall be done.
16	Procedure of released material of over head.
	Disposal of released materials of overhead control telecom alingment and signalling materials as store procedure order no 31 issued COS/ STORE /CORE No.CORE/S/104 /Scarp Dated 02.09.99
Note	The above list is not exhaustive and other items as per existing practice of zonal railways etc. should also be complied while doing RE modification works.