Comparative Analysis Of 25kv, Ac Testing And Installation Of Konkan Railway Eletrification

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***Abstract* - This paper introduce the mechanism implemented in the design and testing of the recently announced Konkan railway electrification on 3 November 2015, which is predetermine for the power supply of part of the electrical tracks in the area of Roha to Verna (381.181) km which is under influence of Konkan Railway. In the electrification process power supply arrangements, traction overhead devices, ancillary civil service, telecommunication engineering works and signaling and AC traction are mentioned. The power capacity of the railway electrification was represent result to the load flow calculation that was described how much overwhelming usage of fuel get deducted after establishment of electrification project**

***keywords* - AC electrified railway system, design and testing, telecommunication and signaling analysis, traction substation, overhead equipment's.**

I. INTRODUCTION (HEADING 1)

Railway tracks in the area of Roha to Verna (381.181km) are electrified with the AC system of 25 kV, 50Hz industrial-frequency; single phase AC supply has been broadly adopted in long distance Electrified Railway system in India on 3 November 2015. The 25 kV A.C. 50 Hz electrification systems have been grown remarkably for railroad traction project. The highlights that separate this method from the standard 3 phases and neutral HV distribution system of the open stock element is that the railroad arrangement is a single-phase mode with one pole earthed. Even though other railway governance has their own particular electrification layout the basic design of the systems is the same.

The 25kV rail organize has been intended to collect the requirements of a quick, intercity, multi-track railroad arrange conveying a classification of trains at a few periods. This manipulation needs an overhead system that is implicitly safe for employees and passengers, reliable and provides a high degree of protection of the supply to the traction units. This will secure that the electrification supply system is efficient to supply the required power levels to accomplish the performance of the traction units.

The 25kV single phase industrial frequency system high voltage A.C. locomotive is a difficult factor of the total A.C. power system configuration.

A factor that makes the railroad on a very basic level not quite the same as the local and business electrical supplies is that the footing unit can change track position consistently. This influences the qualities and execution of the power system and may be liable for equipment malfunctioning due to under voltage, overvoltage or overcurrent. If the supply system is to have a high degree of protection the precise behavior of the complete system must be known and manage for in the design specification. In the event that this isn't edited at the plan arrange, at that point disappointments on the train or at the substation can cause genuine operational challenges once the system has gotten live.

II. WORK OF KONKAN RAILWAY

Provision of most economical & reliable electric contact system to continuously supply power to the moving electric traction. Power supply game plans and arrangement of changes to control the progression of intensity alongside the electric switch gear. Observing and remote control of intensity supply. Power supply arrangements and provision of switches to regulate the flow of power along with the electric switch gear. Monitoring and remote control of power supply. Insurance of signaling and the trackside media transmission circuit and devices against electromagnetic and electrostatic impacts of 25kV, 50Hz, single stage traction power supply. Modern technique of signaling and telecommunications. Legislation of maintenance & operation facilities for electric traction. Communication with electricity authorities to modify their power line crossings to suit 25kV AC traction and avail high tension input supply for TSS.

III. TRACTION SUBSTATION AND LOCATION OF FEEDING POST

The double-circuit 25kV feeders, between the utility and the outdoor trackside stations feeding the overhead device, are provided & owned by the railways. At the feeding posts, the return circuit is connected to the rails. The fundamental consideration in locating the traction substation is to guarantee agreeable voltage condition on the OHE. While the maximum voltage at the substation should not normally exceeds 27.5k, the voltage of the farthest end, based on traction load conditions talking into account the traffic density, the loads and speeds of the trains & the terrain, with one substation taken out of commission, should be not fall below 19kV. The location of TSS is depending upon the proximity of supply authority's

substation. As a first estimate the separation between adjacent traction substations is determined for various situations might be likely taken as under, anyway necessities of increment of deals in future will be taken with:

System	Distance
25kV with Booster Transformers and return conductors	40-50Km
25kv without Booster Transformer	50-80Km
2 x 25kV AT system	80-100Km

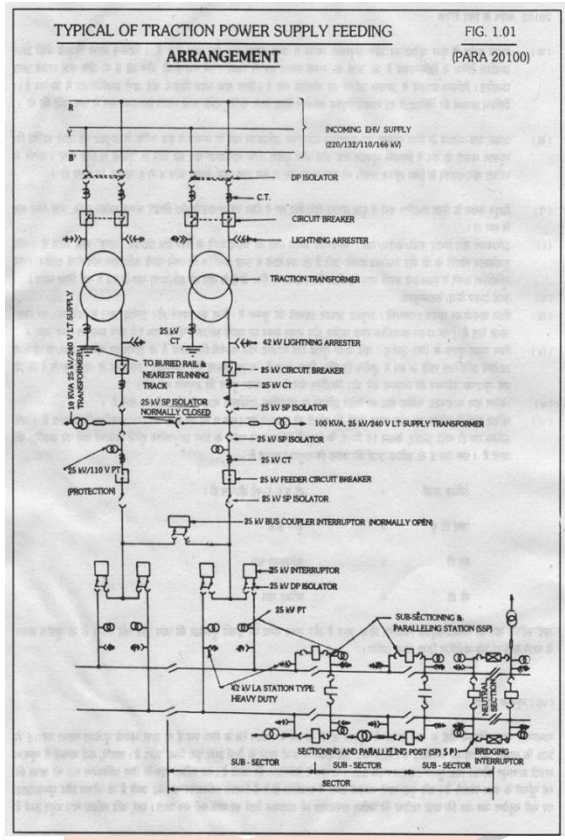

Figure 3: Typical layout of 25KV, 50HZ traction substation

IV. SURVEY FOR RAILWAY ELECTRIFICATION

4.1 GENERAL

After having limited the selection of courses which might be considered for electrification, it is essential to additionally supervise the choice course in detail for its recipient for electrification. To discover the above detail a course is surveyed for Railway Electrification. The review may either be a "Surveillance Survey" or a point by point foot-by-foot" Cost-cost Feasibility Survey" as the conditions calls for.

4.2 OBSERAVTION SUREVY

This is a quick review analyzing the notable and fundamental focuses, leaving the subtleties to be turned out in the broad foot by foot Survey. The possibility for electrification, its expense and its worthwhile so worked out gives satisfactory data dependent on which the task can be captured. This survey has to be included in the programmed for Surveys and sanctioned in the Annual Works Programmed by the Railway Board and separate organization set up to conduct it. Such a circumstance may emerge, for instance, when the expense of information sources has adjusted deeply and the traffic thickness estimate on the course isn't especially over the 'make back the initial investment' level.

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The survey team and its work:

1	Data collection	Remarks
a)	Traction Power supply: Availabilities of power at reasonable tariff. Suitable	Based on discussions and finalizations of details with the concerned power supply

	locations of point of power supply. Cost and time schedule to obtain power supply.	authorities.
b)	Foot by Foot Survey of the Route.	Close coordination of Civil Engineer essential.
c)	Route survey of Railway's transmission line from supplies Authorities' grid sub-station.	Close coordination of Civil Engineer essential.
2)	**Items of works & drawings to be finalized**	**Remarks**
a)	The "Wiring Plan " showing the tracks to be wired	Finalized with
b)	The suctioning Diagram for Traction Overhead Equipment	Open line: The Operating Officer coordinates
c)	The pegging Plans for Traction Over Head Equipment	Prepared as a result of foot by foot survey
d)	Locations of OHE & PSI maintenance depots; their staff strength, tools & plant road & rail vehicles.	Finalized in consultation with open line

V. THE SUBSECTIONING AND PARRALEL POSTING

The neutral section is a dead section and, in this way, the train needs to arrange the section in force. The train is turned off while arranging the impartial segment ton keep away from streak over at the hour of exist & returning the live zone. For this, notice board at 500M, 250M, and last board are turning ON and OFF are given. The location neutral section is regularly given close to the traction substation (TSS) & substation post (SP).

VI. REMOTE CONTROL

Having settled on the separating of the OHE it is to be chosen which area ought to have remote controlled C.B and which ought to be furnished with privately worked manual detaching switches. The sectioning diagram is now combined with the general supply diagram which shows the locations of the remote-controlled switches at the FP, SP, and the SSP's. The physical location of these posts as shown in the pre-pegging plans is finalized after site inspection.
The final pegging plan contains the overlap, the section insulator as well as the location selected for the supply control post.

VII. OVERHEAD EQUIPMENT

The electrical conductor over the track together wills their related fitting, insulators and different connections by methods for which they are suspended and enlisted in position. All overhead electrical devices, distribution lines, transmission lines, and feeders might be all in all indicating to as overhead lines.

Contact wire –
– Cross sectional area - 107 sq.mm.
– Diameter - 12.24 mm
– Normal tension – 1000 kg
– Breaking load – 3905 kg

Catenary wire –
– Cross sectional area - 65 sq.mm.
– Diameter – 10.50 mm
– Normal tension – 1000 kg
– Breaking load – 3920 kg

VIII. CONCLUSIONS

The foreign currency content of the 3KV DC plan in 20th sanctuary was approximately over 75% of total price of project. On the AC plan it has been diminished to approximately lower than 50%, as well as its go for being built up next for advance deduction.

IX. ACKNOWLEDGMENT

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X. REFERENCS

[1] Uglešić, I.; Milardić, V.; Pavić, I. Analysis of the impact of TS Zapresic to the transmission network, Zagreb, 2006 (written in Croatian).

[2] A. Župan, "Influence of electric railway system on current and voltage distortion in power transmission system", Doctoral qualifying exam, HEP-Transmission System Operator, Zagreb, 2012.
[3]] EMTP-RV, documentation, [Online]. Available: www.emtp.com
[4] Power supply installation in electrical traction by Indian Railways Institute of Electrical Engineering.
[5] "25 kV AC railway electrification" – news · newspapers · books · scholar · JSTOR *(July 2009)*
[6] Protection and Switchgear by S.Rao & Badri Ram