

**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)**

2022/Proj./KMRCL/CBTC/30/10

New Delhi, dated 16.01.2024

**PCSTE/Metro Railway,**  
Metro Rail Bhavan,  
J. L. Nehru Road,  
Kolkata-700071  
West Bengal

**Sub- In principal approval for CBTC system for Signalling and Train Control System in Line 3 and Line 6 of Metro Railway Kolkata.**

Ref: (i) RDSO letter no. RDSO-SIG/3/2023 dated 05.12.2023  
(ii) PCSTE/Metro letter no. MRTS/SG-501/53(1134) dated 27.09.2023  
(iii) RDSO letter no. RDSO-SIG/3/2023 dated 05.09.2023  
(iv) PCSTE/Metro letter no. MRK-HQ0SnT(GENL)/26/2023-O/o PCSTE/ HQ/KOL /MRK dated 01.08.23

The Signaling & Telecommunications system architecture & sub system as submitted by Kolkata Metro for Line No. 3 & Line No. 6 project with 3<sup>rd</sup> Rail 750VDC traction system, have been evaluated in consultation with RDSO and approval of the competent authority for the same is hereby conveyed as under:

**A. Signalling Systems:**

SN	Description	Minimum Requirement	Proposed equipment & reference submitted
1	Type of Signalling	Cab Signalling, CATC (ATP, ATO, ATS) and ATS are essential, ATO is optional	CBTC System of M/s Siemens 'Train Guard MT' Generic application R3.2.6, (which is an upgraded version of release R3.1.0 & R3.1.1.5 ) has been planned and is already deployed in following projects:  i. "Siemens Crossrail Project" in London, United Kingdom under CRL contract C620. ii. Nagpur metro M/s Siemens make "Train Guard MT Generic application R 3.1.0 CBTC system".
2	Back up Signalling	Line side (CLS) At entry and exit at all Interlocked stations	The LED based signal lamps as per RDSO spec No. RDSO/SPN/199/2010 Rev 1.0. The shunt signal & route indicator as per RDSO spec No. RDSO/SPN/153/2011 Rev 4.1.
3	Interlocking	EI with built in block working facilities	M/s Siemens, Trackguard Westrace MK-II as EI. Generic SIL 4 certificates submitted as under:  i. 'Processor module' issued by M/s Ricardo Rail on dated 21.12.2015

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SN	Description	Minimum Requirement	Proposed equipment & reference submitted
			<ul style="list-style-type: none"> <li>ii. 'Data preparation system (DPS)' issued by M/s Lloyd's Register on dated 07.11.2014,</li> <li>iii. 'Parallel input module (PIM 50)' issued by M/s Lloyd's Register on dated 03.07.2015,</li> <li>iv. '110 VAC lamp o/p module' issued by M/s Ricardo Rail on dated 26.10.2015 and</li> <li>v. 'Relay output module 50 VDC (ROM50)' issued by M/s Lloyd's Register on dated 12.05.2015.</li> <li>vi. Single phase point machine control equipment &amp; Three phase point machine control equipment issued by M/s Ardanuy ingenieria S.A on 17.07.2013 and 20.03.2015 respectively</li> </ul>
4	Train Control System	CATC (ATP, ATS, ATO Optional)	<p>CBTC of M/s Siemens, TGMT R3.2.6 has been planned.</p> <p>SIL 4 Safety assessment report for Siemens 'Train Guard MT' Generic application R3.2.6 issued by M/s TUV Rheinland on dtd. 23.11.2022.</p> <p>Trainguard MT (CBTC) is composed of a vital ATP and non vital ATO system.</p> <ul style="list-style-type: none"> <li>i. ATO Software safety integrity level is SIL 2.</li> <li>ii. ATS (Siemens Rail 9000) SIL-2 certificate version 27.1 issued by M/s Ricardo Rail on dtd. 17.05.2016</li> <li>iii. Airlink radio communication system (RCS) of M/s Siemens 'TGMT' in 5.8 GHz frequency band for CBTC.</li> </ul>
5	Type of Track Circuits	Coded Audio frequency Track Circuits (AFTC)	<p>Primary means of train detection shall be radio based CBTC system working on 5.8 GHz band and secondary (fall back) means of detection by Digital Axle counter system of M/s Siemens make, Model 'ACM250'.</p> <p>SIL-4 Inspection Certificate for 'ACM250' issued by Safety assessment center M/s Siemens AG Braunschweig on dated 18.04.2018.</p>
6	<b>Point Machine</b>		
	(i) For Main Line	(i) Non-Trailable high thrust, high Performance Point Machine.	Non-Trailable point machine of M/s Siemens, model S700K (three phase AC).
	(ii) For Depot	(ii) Trailable high thrust, high Performance Point Machine.	Trailable point machine of M/s Siemens, model BSG 9.

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SN	Description	Minimum Requirement	Proposed equipment & reference submitted
7	Redundancy in cab Eqpt. for ATP (Cab Sig.)	1+1 (hot standby)	Hot Standby, The redundant head-tail configuration offers hot standby of the redundant OBCU in case the active OBCU fails.

**B. Telecommunication systems:**

SN	Description	Minimum Requirement	Proposed equipment & reference submitted
1	Telecommunication	Integrated system with OFC, Train Radio, CCTV, Centralised clocks, PA system, with the additional provision that Train Display Boards at stations should also be integrated in the system. Regarding Train Radio system, it should be fully digital and duplex system, the standards may be chosen based on techno-economic considerations.	<ul style="list-style-type: none"> <li>i. FOTS system</li> <li>ii. PAS &amp; PIDS</li> <li>iii. Master clock System</li> <li>iv. Centralized Data recording system (CDRS)</li> <li>v. TETRA Radio communication System</li> <li>vi. CCTV system</li> <li>vii. Access control intrusion detection system (ACIDS)</li> <li>viii. Telephone communication system</li> <li>ix. Telephone Supervisory Control And Data Acquisition (TSCADA)</li> <li>x. Office Automation and information technology</li> </ul>
2	Positive Train Identification	Provided with interface between ATS and Train Radio.	Positive train identification is being taken care by Signaling CBTC system itself.

The above approval is subjected to compliance of following stipulations before opening the line for passenger operation/revenue services: -


- i. Before opening of the line for passenger services/revenue operations, complete assessment report and certification by ISA for achievement of required levels of safety as per latest CENLEC standards wherever applicable for train operation in Kolkata Metro for complete signaling & train control System including all subsystems for both phases (Line 3 and Line 6) shall be ensured and a copy of same shall be submitted to RDSO.
- ii. Safety and operational performance certificate from London metro authorities for release 3.2.6 shall be submitted.
- iii. The Preliminary & Final system hazard analysis and acceptance of its mitigation by Kolkata Metro shall be submitted to RDSO as well as to CRS and any hazard which require manual intervention/special instruction shall be suitably framed, incorporated and implemented by Metro authorities.
- iv. Documents as per Annexure E1 of "Procedure for Safety Certification and Technical Clearance of Metro System" Including EMI/EMC report related to rolling stock may be submitted to RDSO considering all mission critical frequencies.



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- v. Kolkata Metro shall carry out rigorous testing of all mode of interference (both out of band and in band interferences) to prove non-susceptibility of frequency band used for CBTC application to any kind of interference and shall align the access points for better reliability & test report shall be submitted to RDSO.
- vi. The details of authorities responsible for maintenance of signaling system to the required level of safety during train operation shall be submitted to RDSO.
- vii. Details /documents/ compliance related to arrangements made by Kolkata Metro for Line 3 & Line 6 project to prevent risk of Cyber threats to Signalling and communication System/subsystems shall be submitted to RDSO before the start of revenue operations.
- viii. Kolkata Metro has submitted that the ATO and ATS is SIL 2, and all potentially unsafe effects of safety related functions performed by ATS and ATO shall be mitigated by mandatory interaction with SIL 4 subsystems (ATP and EI) however dependency of operating authorities on VDU display units to run the trains during failure situations shall require a minimum level of SIL2 for VDU. If the same level of certification is not achieved, manual running of trains during signal failure condition shall not be done relying only upon the indication by ATS & suitable instructions regarding this shall be framed and strictly implemented.
- ix. For the proposed system by Kolkata Metro for Line no.3 & Line no.6 is with Grade of Automization "GoA2" i.e. STO (Semi Automatic): Train start & Stop-Automatic, Door operation & Handling emergencies-Manual.
- x. Kolkata Metro shall ensure proper earthing & bonding as per standard practice.
- xi. M/s TUV India Private Ltd (which is on RDSO's approved ISA panel for Metro Signalling Project), has been appointed for ISA for Train Control and Signalling system of Line 3 & Line 6.
- xii. Regarding PSD, provided an interface with a future deployment of Platforms Screen Doors since PSD will not be available in initial phase.

Documents finalized duly signed by Kolkata Metro as indicated in item (i) to (xii) listed above shall be submitted to RDSO & for item (iii) to CRS **as per annexure E1** before start of passenger services/revenue operations. Further, fulfillment of "minimum requirement" described vide Annexure E1 & Annexure E2 of Metros as per "Procedure for Safety Certification and Technical Clearance of Metro Systems" shall be ensured.

  
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