GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

2024/Proj./MPMRCL/Indore/SPC/D2/30/91 New Delhi, dated 07.11.2024

Managing Director,
Madhya Pradesh Metro Rail Corporation Limited (MPMRCL)
10th Floor, Zone-14, Appollo Premium Towers,
Vijay Nagar Square, NRK Business Park,
AB Rd, Scheme 54 PU4,
Indore, Madhya Pradesh 452010

Sub: In-Principle Approval for 750 V DC Traction & Power Supply and SCADA System (Annexure D2) for Super Priority Corridor of Indore Metro Project of Madhya Pradesh Metro Rail Corporation Limited (MPMRCL) i.e. Gandhi Nagar Station to Super Corridor 03 Station- (Up Line Ch.: 15067.986 m to Ch.: 20330.786 m and DN Line Ch.: 20323.183 m to 15062.014 m), including 01 depot at Gandhi Nagar

Ref: Annexure D-2 and related certificates & documents submitted by MPMRCL on RDSO's online portal dated 04.10.2024, 28.09.2024, 18.09.2024, 06.08.2024 & 08.05.2024

Madhya Pradesh Metro Rail Corporation Limited (MPMRCL)'s request for In-Principle Approval for 750 V DC Traction & Power Supply and SCADA System as per Annexure D2 (copy enclosed) for Super Priority Corridor of Indore Metro Project of Madhya Pradesh Metro Rail Corporation Limited (MPMRCL) i.e. Gandhi Nagar Station to Super Corridor 03 Station- (Up Line Ch.: 15067.986 m to Ch.: 20330.786 m and DN Line Ch.: 20323.183 m to 15062.014 m), including 01 depot at Gandhi Nagar, has been examined in Board's office in consultation with RDSO and approval of the competent authority is hereby conveyed subject to submission of following reports for Super Priority Corridor sections as per undertakings of MPMRCL:-

1. Submission of EMI/EMC simulation assessment report in November 2024
2. Submission of SCADA Integration & Commissioning Test Report in December 2024
3. Submission of Emergency Trip System & Compliance Report in November 2024
4. Submission of performance certificate of dry type Transformer (200 KVA, 500 KVA, 2000 KVA and 2850 KVA) in November-2024

Contd.....2/

5. Indore Metro will monitor the performance of following items (Installed at Indore Metro rail project) up to two years from the date of commencement of commercial operation for provenness:

    a) 1.1kV, 2Cx2.5 mm2, 2Cx6 mm2, 2Cx25 mm2, 2Cx50 mm2, 3Cx1.5 mm2, 4Cx2.5 mm2, 4Cx4 mm2, 4CX35 mm2, 4Cx6 mm2, 4Cx25 mm2, 7Cx1.5 mm2, 12Cx1.5 mm2, 12Cx2.5 mm2, 19Cx1.5 mm2, 19Cx2.5 mm2 Control Cables
    b) 180AH & 300AH Battery
    c) 110V/50A, 110V/100A and 110V/150A Battery Charger
    d) 4 kVA & 230V UPS
    e) 400 sq. mm, Cu, DC Positive and negative Cable, 300 sq. mm, Al, LT Power Cable, 95 sq. mm, 33 kV, Cu Power Cable

Any dilution in the Stipulation/Compliances as submitted and detailed in Annexure- D2 suo moto by MPMRCL shall automatically invalidate the technical clearance.

Encl: as above

7.11.24

(F. A. Ahmad)
Director/Gati Shakti (Civil)-IV
Railway Board
Ph: 011-47845480
Email: dirgsc4@gmail.com

Copy to:

(i) Executive Director/UTHS, RDSO, Manak Nagar, Lucknow w.r.t letter No. UT/MPMRCL/IM/P01/042024 dated 08.10.2024

(ii) OSD/UT & Ex-Officio Joint Secretary, Ministry of Housing & Urban Affairs (MoHUA), Nirman Bhavan, New Delhi-110011

(iii) ED/EEM, Railway Board

Annexure-I

Traction & Power Supply System (3rd Rail Bottom Current Collection-750 V DC) for Super Priority Corridor of Indore Metro Project of MPMRCL i.e. Gandhi Nagar Station to Super Corridor 03 Station (Up Line Ch.: 15067.986 m to Ch.: 20330.786 m and DN Line Ch.: 20323.183 m to 15062.014 m)			
S. N.	**System**	**Features**	**Standards/Drawings**
1.0	**POWER SUPPLY: Incoming 33 kV** (Temporary connection of 33 kV power supply (Double Feeder) at SC-03 station (near TCS company) from an existing 33 kV overhead line owned by MPPKVVCL.)		
2.0	**Traction Sub-Station (TSS)**	**33 kV (AC)/ 0.585-0.585 kV (AC)/ 750 V (DC)**	As per technical details submitted by MPMRCL for the super priority corridor of Indore Metro Rail Project.
3.0	**Earth Resistance (TSS)**	<1.0 Ω	IS 3043, IEEE-80
4.0	**Transformer – Rectifier unit**	• Cast Coil Dry Type Transformer • Capacity: 2850 kVA (2 Nos) • One Primary & Two Secondary Winding • Vector Group: D (±7.5°)d0y11 • Cooling Mode: AN • Overload Capacity: (a) 150 % for 2 Hours (b) 300 % for 1 minute • Tap Changer: +5% to -5% in step of 2.5% each (in 5 steps) (Off circuit Tap links) • Insulation Class: (HV/LV) : F/H • Type : Indoor	IS 2026-11, IEC 60076-11, EN 50329 Class VI.
5.0	**Auxiliary Sub-Station (ASS)**	**33 kV/0.415 kV**	As per technical details submitted by MPMRCL for the super priority corridor of Indore Metro Rail Project.
5.1	Earth Resistance of ASS	<1.0 Ω	IS 3043, IEEE-80
6.0	**Auxiliary Transformer**	• Cast Coil Dry Type Transformer • Capacity: 200 kVA, 500 kVA & 2000 kVA • 33 KV/0.415KV, 3 phase • Vector Group: Dyn11 • Cooling Mode: AN • Tap Changer: +5% to -5% @ 2.5% (Off circuit Tap links) • Insulation Class: (HV/LV): F/H • Type : Indoor	IS 2026-11, IEC 60076-11

Approved on 07/11/2024

7.0	**750 V DC Traction System (Bottom Current Collection)**		
7.1	**Conductor Rail (Third Rail)**	Steel & Aluminium (Co-Extruded)	As per technical details submitted by MPMRCL for the super priority corridor of Indore Metro Rail Project.
7.2	Nominal Current at 45° C ambient	4500 A DC	
7.3	Nominal Voltage	750 V DC	
7.4	Designed voltage	1000 V DC	
7.5	Transient Voltage	3000 V DC	
7.6	Max. Electrical Resistance at 20° C	6.35 micro ohm / meter	
7.7	Maximum Heat Rise at an Ambient Temp. of 45° C	35.60 °C at an Ambient Temp. of 45° C	
7.8	Short Circuit Level	100 kA for 150 ms	
7.9	Linear mass	17.2 kg/mtr.	
7.10	Thickness	6 mm	
7.11	Stainless Steel Strip	Chromium: 16.022 %	
8.0	**Cables (DC & AC)**	• 400 sq.mm, 5R X 1C, XLPE, Copper (Cu) • Voltage grade: 1.8/3 kV , DC Cable • Conductor: Plain annealed Copper Class 5. • Outer Sheath : FRLSH PVC Type, ST-2 Sheathed, ATR UV Resistance • Colour - Red	IEC-60502-1, IEC-60332-1, IEC-60228.
		• 400 sq.mm, 5R X 1C, XLPE, Copper (Cu) • Voltage grade: 0.6/1 kV , DC Cable • Conductor: Plain annealed Copper Class 5 • Outer Sheath : FRLSH PVC Type, ST-2 Sheathed, ATR UV Resistance • Colour – Black	IEC-60502-1, IEC-60332-1, IEC-60228.

		TSS cable: • 240 sq.mm, 3R x 1C, XLPE(Cu), 33 kV FRLS, Power Cable • Conductor screen material – Extruded semiconducting compound. • Non-Metallic Insulation Screen material – Extruded Semi-conducting Compound (Bonded Type) • Outer Sheath- Extruded FRLSH PVC ST-2, Black colour	IEC-60502-2, IEC-60332-1, IEC-60228
		TSS cable: • 95 sq.mm, 3R x 1C, XLPE(Cu), 33 kV FRLS, Power Cable • Conductor screen material – Extruded semiconducting compound. • Non-Metallic Insulation Screen material – Extruded Semi-conducting Compound (Bonded Type) • Outer Sheath- Extruded FRLSH PVC ST-2, Black colour	IEC-60502-2, IEC-60332-1, IEC-60228
9.0	**Insulator**	Bulk molding compound (BMC) insulator	As per technical details submitted by MPMRCL for the super priority corridor of Indore Metro Rail Project.
9.1	Creepage Distance	159.1 mm	
9.2	Fume index	≤ 20 (F1 classification)	
9.3	Impact Resistance (Min)	400 J/m (Minimum)	
9.4	DeflectionTemperature	80 °C at 1.82 N/mm2	
9.5	Water Absorption	0.3 % (Max) in 24 hrs at 23°C	
9.6	Dielectric Strength	10 kV/mm	
9.7	Flame SpreadIndex	15 (Max)	
10.0	Horizontal & Vertical Clearances of Third Rail	As per MPMRCL's SOD, approved by Railway Board	
11.0	Over Voltage Protection Device (OVPD)	• Rated Voltage - 900 V • rated Current- 900A • Rated Short time current - 100 kA for 0.1 Sec. • Rating of Voltage sensing device- ±150 V(Linear until ±280V) • Rating of Current sensing device- ±1000A	EN-50122-1
12.0	Control, Relay & Protection System	1. 33 kV Traction Transformer: a. O/C and E/F non-directional protection. b. Winding Over Temperature protection	IEC 60255, IEC 61850

		2. Feeder Protection(Incoming & Outgoing) : a. O/C and E/F directional & non-directional protection. b. Cable differential protection c. Under voltage & Over voltage protection 3. Bus Coupler: a. O/C and E/F non-directional protection. b. Trip circuit supervision & Master trip protection 4. Auxiliary Transformer feeder: a. O/C and E/F non-directional protection. b. Winding Over Temperature protection c. Standby Earth Fault protection 5. DC Rectifier Protection a. Reverse Power Relay (32) b. DC Overcurrent protection c. Under Voltage Close Inhibit Protection d. Instantaneous over current protection e. Inverse time overcurrent protection f. Over voltage relay g. High Speed Tripping Lock-out h. Frame fault i. Inter tripping 6. DC Feeder Protection: a. DC Line Testing device b. Under Voltage Relay c. Over voltage Relay d. Instantaneous overcurrent protection e. Inverse time overcurrent protection f. DC Overcurrent protection g. di / dt, Rate of current rise protection h. Delta I and Imax protection (ΔI) i. Frame fault. j. Inter tripping k. DC feeder HSCB Auto reclosing. l. High Speed Tripping Lock-out	
13.0	DC Switchgears	• High Speed Circuit Breaker (HSCB) • Rated Voltage - 900 V • Max. operating voltage- 1000 V	EN 50123, IEC 61992-2

Approved on 07/11/2024

<table>
<tr><td></td><td></td><td>• Rated Cont. Current- 4000A (for feeder CB) and 6000A (for Rectifier CB)
• Rated Short time current for 10 Sec - 10.90kA (for feeder CB) and 18.0 kA (for Rectifier CB)
• Rated Breaking Capacity- 125 kA for 100 ms
• Tripping Time- Opening time not more than 5ms and breaking time not more than 20ms</td><td></td></tr>
<tr><td>14.0</td><td>SCADA System</td><td>In SCADA system

a. RTU is provided with redundant Ethernet switches at stations and RSS.
b. Redundant communication link between RTU and TER network for communication to OCC/BCC servers.
c. Redundant communication server, application server, database server at OCC & BCC.
d. Redundant communication link between TER network to SCADA servers.
e. Data transfer protocol as per IEC 60870-5-104.
f. Network protocol between RTU and Relays/IEDs/OVPD as per IEC 61850.
g. Protocol between RTU and EM/MFM/Temp scanner through MODBUS.
h. Data Speed- 100 mbps</td><td>IEC 60870-5-104,

IEC 61850</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="5">Battery</td><td>Capacity</td><td>180 AH</td><td>300 AH</td></tr>
<tr><td>material</td><td>Ni-cd</td><td>Ni-cd</td></tr>
<tr><td>No. of Cell</td><td>85</td><td>2x85</td></tr>
<tr><td>Electrolyte</td><td>KOH solution</td><td>KOH solution</td></tr>
<tr><td>Approx. Cell weight</td><td>21.79 KG</td><td>17 KG</td></tr>
</table>
</td><td>IEC 62259

IEC 60410</td></tr>
<tr><td></td><td></td><td>UPS:4KVA, 415 V AC +/- 15% input, 230 V AC ± 1%</td><td>IEC 60529
IEC 62040
IEC 62623</td></tr>
<tr><td></td><td></td><td>Battery Charger: 50A/100A/150A Thyristor base dual float Cum Boost charger</td><td>As per technical details submitted by MPMRCL for the super priority corridor of Indore Metro Rail Project.</td></tr>
</table>

Note:- Any suo moto dilution in the Stipulation/Compliances as submitted by MPMRCL and detailed above shall automatically invalidate the technical clearance.

Approved on 07/11/2024