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रेल अग्रदूत Transforming Railways

No.MC/AC EMU/Indigenous 3-phase/Medha

Date: 11.04.2016

महाप्रबन्धक (इंजीनियरिंग),

1. मध्य रेलवे, छत्रपति शिवाजी टर्मिनस मुम्बई – 400 001
2. पश्चिम रेलवे, चर्च गेट, मुम्बई – 400020

Sub: Final speed certificate for operation of 12 Car formation BG AC EMU rakes fitted with indigenous 3- phase propulsion system of M/s Medha Servo Drives and having pneumatic suspension in secondary stage manufactured by ICF/Chennai, up to a maximum operational speed of 105 kmph on track maintained to other than C&M-I Vol-I standards.

Ref: Railway Board letter no.2011/Elect(G)/181/1 dated 03.02.2014

1.0 Railway Board vide letter under reference has allotted two rakes of AC EMUs with 3- phase indigenous Medha Electrics to Western Railway for design, development, manufacture, supply, testing and commissioning of 3-phase propulsion system (M/s Medha Servo Drives) and equipment for BG AC EMU rolling stock to be built at ICF, Chennai for operation in Mumbai sub-urban area.

1.1 ICF Chennai has manufactured AC EMUs with 3-phase indigenous Medha Electrics as per following ICF layout drawing nos. These ICF layouts have been approved and following transportation codes have been allotted by Railway Board vide letter no.87/M(C)/202/10/Vol.III (Pt.iii) dated 23.07.2014. Tare weight and gross weight of Motor coach, Trailer `C' coach, Driving Trailer `D' coach & Trailer `D' coach with handicapped compartment are tabulated below:

S No.	Description	Layout drawing no.	Transportation code	Tare wt	Gross Wt
1.	Layout of Trailer "C" coach	ICF/SK3-9-0-126 alt 'a'	EW/TC/FS1	37t	70.78t
2.	Layout of Motor coach	ICF/SK3-9-0-127 alt 'a'	EW/DMC/S1	54t	80.28t
3.	Layout of Driving Trailer "D" coach	ICF/SK3-9-0-128 alt 'a'	EW/DTC/YV1	39t	71.77t
4.	Layout of Trailer "D" coach with handicapped compartment	ICF/SK3-9-0-129 alt 'a'	EW/TC/YDV1	38t	69.45t
5.	Layout of Trailer "C" coach	ICF/SK3-9-0-130 alt 'a'	EW/TC/FYY1	37t	69.82
6.	Layout of Motor coach	ICF/SK3-9-0-131 alt 'a'	EW/DMC/S1	54t	80.28
7.	Layout of Driving Trailer "D" coach	ICF/SK3-9-0-132 alt 'a'	EW/DTC/SDV1	39t	71.77t
8.	Layout of Trailer "D" coach with handicapped compartment	ICF/SK3-9-0-133 alt 'a'	EW/TC/SV1	38t	69.45t

1.2 AC EMU rakes with indigenous 3- phase propulsion system of M/s Medha Servo Drives have been designed for maximum service speed of 110 kmph. These coaches have been fitted with semi permanent coupler and electro pneumatic air brake system.

1.3 The bogies of Motor Coach (MC), Trailer `C', Driving Trailer `D' coach and Trailer `D' coach with handicapped compt. have been provided with pneumatic suspension in the secondary stage and other details of these coaches are as under:

<table>
<tr><th>system</th><th>Motor Coach (MC)</th><th>Trailer `C'</th><th>Driving Trailer `D' coach</th><th>Trailer `D' coach with handicapped compt</th></tr>
<tr><td>Bogie General Arrangement (drawing no.)</td><td>EMU/M/3PH (617)-0-0-001</td><td>ICF/MRVC/C/BT (573)-0-0-001</td><td colspan="2">ICF/MRVC/D/BT(575)-0-0-001</td></tr>
<tr><td>Wheel & Axle (drawing no.)</td><td>DMU/DPC/SS-O-2-002/col.1</td><td colspan="3">DC/EMU/H2-0-1-202/col.1</td></tr>
<tr><td rowspan="3">Details of Brake System (drawing no.)</td><td colspan="4">EP Brake for all coaches</td></tr>
<tr><td>Schematic ICF/MRVC/M/BT(574)-3-5-001</td><td>Schematic ICF/MRVC/C/BT(573)-3-5-001</td><td>Schematic ICF/MRVC/D/BT(575)-3-5-001</td><td>Schematic ICF/MRVC/D/HC/BT(576)-3-5-001</td></tr>
<tr><td>Layout of EP Brake ICF/MRVC/M/BT(574)-3-5-002</td><td>Layout of EP Brake ICF/MRVC/C/BT(573)-3-5-002</td><td>Layout of EP Brake ICF/MRVC/D/BT(575)-3-5-002</td><td>Layout of EP Brake ICF/MRVC/D/HC/BT(576)-3-5-002</td></tr>
<tr><td>Brake arrangement (drawing no.)</td><td colspan="4">EMU/M (089)-3-2-064 for all coaches.</td></tr>
<tr><td>Coupler (drawing no.)</td><td colspan="4">Semi permanent Coupler: Male: 088-2-1-007/col.8
Female: 088-2-1-007/col.9 for all coaches.</td></tr>
<tr><td>Brake ratio (drawing no.)</td><td colspan="4">EMU/M(089)-3-2-064 for all coaches.</td></tr>
<tr><td>Suspension arrangement (drawing no.)</td><td>ICF/MRVC/M(374)-9-0-006</td><td colspan="3">ICF/MRVC/C (373)-9-0-004.</td></tr>
<tr><td>Max. axle load</td><td colspan="4">20.32t for all coaches</td></tr>
</table>

1.4 The AC EMU rakes with indigenous 3- phase propulsion system of M/s Medha Servo Drives and having pneumatic suspension in secondary stage is similar to existing AC EMU MRVC Phase-II coaches with M/s Bombardier Electrics and having pneumatics suspension in secondary stage which is already in service.

1.5 Oscillation trials of existing AC EMU MRVC Phase-II coaches with M/s Bombadier Electrics and having pneumatics suspension in secondary stage had been carried out and results are contained in RDSO report no. RDSO/2014/TG/MT-1323/F/Rev.0/Amendment-nil dated 08.04.2014. After successful oscillation trials, RDSO had issued

(i) Speed certificate No. MC/EMU/MUTP dated 29.08.2014 followed by amendment 1 no. MC/EMU/MUTP dated 10.10.14 and amendment 2 no. MC/EMU/MUTP dated 21.11.2014 for running BG AC EMU passenger coaches upto a maximum operational speed of 105 km/h on track maintained to other than C& M-I, Vol.-I.

(ii) Speed certificate No. MC/EMU/MUTP dated 25.01.2016 for running above BG AC EMU passenger coaches upto a maximum operational speed of 110 km/h on track maintained to C& M-I, Vol.-I.

1.6 In view of above CCRS, Lucknow was approached for dispensation of oscillation trials and permit normal operation of 12 Car formation BG AC EMU rakes fitted with indigenous 3- phase propulsion system of M/s Medha Servo Drives and having pneumatic suspension in secondary stage manufactured by ICF/Chennai, up to a maximum operational speed of 105 kmph on track maintained to other than C&M-I Vol-I standards. CCRS vide letter no. Q.17016/03/2015-16-TW, dated 29.12.2015 has accorded permission to dispense with oscillation trials (copy enclosed).

2.0 Based on the above, it is certified that 12 Car formation (DTC+MC+TC+HTC+MC+TC+HTC+MC+TC+TC+MC+DTC) BG AC EMU rakes with indigenous 3- phase propulsion system of M/s Medha Servo Drives and having pneumatic suspension in secondary stage, is considered safe for operation up to a maximum operational speed of 105 kmph on track maintained to other than C&M-I Vol-I standards subject to following conditions:

2.1 Track

2.1.1 The track shall be to a minimum standard of 52 kg/90UTS rail laid on PRC sleeper with 1540 sleeper density on 250mm ballast cushion below the sleepers which may consist of at least 100mm clean and rest in caked up condition, on compacted and stable formation. However, for sections having 52kg/72UTS rail laid on PRC sleeper with 1540 sleeper density on 250mm ballast cushion below the sleepers which may consist of at least 100mm clean and rest in caked up condition, on compacted and stable formation, maximum speed shall be 75kmph.

2.1.2 For Track maintained to lower standard than that mentioned above' the Chief Engineer shall decide the lower maximum permissible speed on the basis of maintenance condition. In this connection, Railway Board's letter No. 65/WDO/SR/26 dated 19/20.10.1966 may be seen. When the Chief Engineer considers that the road bed is not compacted or there is improper drainage, he may suitably restrict the maximum permissible speed depending on the local conditions.

2.1.3 The maximum permissible speed on curve shall be decided on the basis of existing provision of the Indian Railways Permanent Way Manual, Second reprint –2004.

2.1.4 The welds shall be protected by joggled fish plates as per provisions of Para 6.4 and Para 8.14 of USFD Manual and Para 6.3 of AT welding manual and other policy instructions of Railway Board. The maintenance of Rails and Rail joints shall be ensured as per Para 250 & 251 of IRPWM. In addition, wherever condition warrants on account of corrosion on rail/weld collar, wear on rail, cupping of welds etc., necessary precautions shall be taken for fish plating/joggled fish plating.

2.1.5 Zonal Railway may ensure further examination of track as deemed fit based on age cum condition basis, overdue renewal and condition of formation etc. as per provisions of Chapter-III of IRPWM.2004 regarding permanent way renewals.

2.2 Bridges

2.2.1 The clearance refers to Bridges (Standard Spans) with standard design of girders, slabs, pipe culverts, piers and abutments etc. designed and issued by RDSO for BGML, RBG and MBG-1987 standard loadings. However, the bearings of span 76.2 m (clear) designed for BGML

standard loading as per RDSO's drawing no.BA-11154 should be strengthened by providing two additional anchor bolts.

2.2.2 Superstructures and Bearings of "Special Span" (designed and constructed by Zonal Railways based on site requirement) including all arches and substructure of all bridges (all Standard and Special spans) are to be examined under the directions of the Chief Bridge Engineer concerned and certified safe with respect to current Indian Railway Standard Codes with up to-date correction slips.

2.2.3 Location of bridges on which speed restrictions are imposed shall be notified by the Railways and incorporated in the working timetable.

2.2.4 The clearance is subject to the following parameters of AC EMU rakes fitted with indigenous 3-phase propulsion system of M/s Medha Servo Drives:

(i) Maximum axle load (Design) of MC	= 20.32t
(ii) Maximum axle load (Design) of TC`C'/TC`D' with HC/DTC	= 20.32t
(iii) Max. Tractive effort of MC	= 13.76 t
(iv) Max. Braking force of MC	= 5.116 t
(v) Max. Braking force of TC`C'/TC`D' with HC/DTC	= 3.82 t
(vi) C.G. Height from Rail Level (MC/TC`C'/TC`D' with HC /DTC)	= Not exceeding 1830 mm

2.2.5 The above clause have been arrived considering bridges are in physically sound condition. In case the bridges are not in satisfactory physical condition, necessary speed restriction to be imposed by concern Chief Bridge Engineer of Zonal Railway.

2.3 Signaling

2.3.1 Provisions of GR, SR, SEM and all extant instructions issued from time to time shall be complied with.

2.3.2 While running through a station, speed of the train shall be restricted to the maximum permissible speed as per standard of interlocking provided at the station.

2.3.3 On the sections where EBD of more than 1 km is to be catered for, second distant signal or automatic signaling should be available failing which suitable speed restriction is to be imposed.

2.3.4 "In the normal single phase 25KV AC electrified section where electric locomotive is used, provisions given in Para 22.6, 22.7, 22.8, 22.9 & 22.10 of SEM Pt. II regarding maximum permissible length of track circuits, signal feeding, maximum permissible length for operation of Point motor, use of block instruments and use of AFTC/axle counters for higher catenary currents limited to 800A on single track section and 1000A on double track section shall be ensured by the Railway".

2.3.5 The condonation regarding infringements in schedule of dimensions, if any, shall be obtained in accordance with local conditions, before movement.

2.4 Traction Installation:

2.4.1 The 25 KV AC OHE shall have swivelling type Cantilever Assembly having tension in the conductors, regulated automatically with a presag. The presag of 50/100 mm is on the Contact Wire for a maximum span of 72 m, proportionately less for smaller spans.

The DC OHE is simple polygonal type of OHE. The tension in the conductors are non regulated. This has a speed potential of 120 kmph from design point of view. At location where DC Section Insulators are installed, the speed shall not be more than 80 kmph.

The speed potential of converted `Unregulated 25 KV AC overhead Traction Equipment' remains the same as of `Unregulated DC Overhead Traction Equipment'.

2.4.2 In case of locations where 25 KV AC Porcelain Section Insulators are installed on main line and lies within first 1/10th and 1/3rd of the span, immediately after the OHE Structure and the Runners are in trailing direction, the maximum speed shall be 120 kmph. At all other locations where 25 KV AC Porcelain Section Insulators are installed, the speed shall be limited to 80 kmph.

2.4.3 It is recommended that the Cantilevers in the Section should have BFB Steady Arm (RI No. 2390) with 25mm Drop Bracket Assembly (RI No. 2360) instead of Tubular Steady Arm (RI No. 2520). Bent Steady arm at overlap locations shall continue.

2.4.4 In 25 KV AC traction area, the CEE of the Railway shall have to ensure that the minimum height of Contact Wire and electrical clearances as stipulated in provisions of Chapter –V and V-A, Electric Traction `Schedule of Dimensions of 1676 mm gauge (BG) revised 2004' with latest Addendum & Corrigendum Slips is not violated and strictly followed to ensure its safe running.

2.4.5 In addition to above, the Chief Electrical Engineer of the concerned Railway may impose any temporary speed restriction on the basis of personal knowledge, experience of the Sectional OHE and the field conditions prevailing on the particular section.

2.4.6 The current collection shall be made through one number Pantograph fit for high speed operation.

2.5 Rolling stock

2.5.1 Before starting the operation of the above stock, CME/CEE of the concerned Railway shall certify the track worthiness and safety of the rolling stocks. He shall also ensure proper maintenance of the rolling stock.

2.5.2 Brakes of coaches shall be in good working order during the operation.

2.6 General

2.6.1 All the permanent and temporary speed restrictions in force and those that may be imposed from time to time due to track, bridges, curves, signaling and interlocking etc. shall be observed.

2.6.2 The profile of AC EMU MRVC Phase-II stock fitted with M/s Bombardier electrics infringes clause nos. 10, 14, 24, 25, 26, & 29 of chapter IV (A) of IRSOD (BG), revised 2004. Railway Board have condoned these infringements vide their letter no. 2014/CEDO/SD/RS/02, dated 03.02.2015 & dated 16.07.2015 and the profile of 12-car AC EMU rakes fitted with indigenous 3-phase propulsion system of M/s Medha Servo Drives is having outer dimensions similar or within to AC EMU MRVC Phase-II stock fitted with M/s Bombardier electrics.

2.6.3 For operation of 3622mm wide stock EMU stock, stipulation under relevant para of IRSOD (BG) revised -2004 should be ensured by Zonal Railway for required clearances.

संलग्नक:

1. ICF/SK3-9-0-126 to ICF/SK3-9-0-133 (08 layout drawings)
2. ICF bogie general arrangement drawing nos.
   EMU/M/3PH (617)-0-0-001 for motor coach,
   ICF/MRVC/C/BT (573)-0-0-001for trailer `C' coach &
   ICF/MRVC/D/BT(575)-0-0-001for driving trailer 'D' and
   Trailer `D' with handicapped compartment.
3. Railway Board letter no. 2011/Elect(G)/181/1, dated 03.02.2014
4. Railway Board letter no. 87/M(C)/202/10/Vol.III (Pt.iii) dated 23.07.2014.
5. Railway Board letter no. 2014/CEDO/SD/RS/02, dated 03.02.2015
   & dated 16.07.2015.
6. CCRS letter no. Q.17016/03/2015-16-TW, dated 29.12.2015.

(संजय कुमार)

कार्यकारी निदेशक मानक/ चालन शक्ति

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2. मुख्य रेल संरक्षा आयुक्त, अशोक मार्ग, लखनऊ–226001
3. महाप्रबन्धक (यांत्रिक/संचालन/संकेत एवं दूरसंचार/ विद्युत)
   i) मध्य रेलवे, छत्रपति शिवाजी टर्मिनस मुम्बई – 400 001
   ii) पश्चिम रेलवे, चर्च गेट, मुम्बई – 400020

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1. ICF/SK3-9-0-126 alt ' a'to ICF/SK3-9-0-133 alt 'a' (08 layout drawings)
2. ICF bogie general arrangement drawing nos.
   EMU/M/3PH (617)-0-0-001for motor coach,
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   ICF/MRVC/D/BT(575)-0-0-001for Driving trailer 'D'
   Coach and trailer `D' coach with handicapped compartment.
3. Railway Board letter no. 2011/Elect(G)/181/1, dated 03.02.2014
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5. Railway Board letter no. 2014/CEDO/SD/RS/02, dated 03.02.2015
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