Tele : 0535-2424 RDSO-IN
Fax : 91-0522-259972
तार : 'रेलमानक' लखनऊ
Telegram : 'RAILMANAK', Lucknow
टेलीफोन/Tele : 50567 & 50017

o/c

(16)

भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ-226011
Government of India-Ministry of Railways
Research Designs & Standards Organisation
LUCKNOW - 226011

314/1

No. SV.EMU. (Retro-AS)

13 Nov. 98

The General Manager(Engg.),
1. Central Railway, Mumbai (CST),
2. Western Railway, Churchgate, Mumbai.

Sub: Final maximum permissible speed of dc EMU stock having modified ICF bogie with pneumatic spring supplied by M/s CONTITECH, Germany.

On account of many fold increase in payload conditions in the dc EMU stock plying in the sub-urban sections of Central /Western Railway, following two serious problems are being encountered :

(i) Breakage of bogie parts due to mechanical hitting during dynamic condition , and

(ii) Poor riding.

1.1 Several attempts to improve the design of existing bogies ,by using conventional components, did not yield desired results in terms of improved riding mainly on account of very high variation in load from tare to gross condition and hence the only solution left was to use a suitable bogie suspension element which could cope up with the situation.

1.2 Design deliberations thus concluded that use of pneumatic suspension at secondary stage is the only right solution. Advantages associated with the pneumatic suspensions are :

- No change in height of spring with change in load.
- Vital bogie clearance do not chang
- Stiffness increases with increases in load, and vice versa, thereby giving a ride performance generally not affected by load.
- It is possible to eliminate swing link arrangement from existing bogie which is a critical item as pneumatic suspension itself does the task of lateral suspension.

1.3 In pursuance of the above objective, necessary modifications were carried out in two dc EMU coaches - one driving trailer coach & the other a motor coach to fit pneumatic suspension at secondary stage in their bogies . General arrangement of modified ICF bogies is given in the following drawings :

(i) Driving trailer coach - DC/EMUT/ ASR-0-0-001
(ii) Motor coach. - DC/EMUM/ASR- 0-0-001

Salient features of these bogies are :-

(i) Primary suspension arrangement including guidance system is exactly identical to standard ICF dc EMU all coil bogies excepting that axle box springs have been made slightly more stiff.

(ii) Swing link arrangement has been eliminated pneumatic secondary suspension itself acts in lateral mode.

(iii) Weight transfer takes place through side bearers and centre pivot acts as a centre of bogie rotation - this is a standard arrangement in existing ICF dc EMU stock bogie.

(iv) Bogie frame structure is identical to standard ICF dc EMU bogies.

(v) Additional double acting hydraulic external dampers have been provided for secondary stage lateral mode.

(vi) Secondary vertical damping has been changed to +/-300 kg at 10 cm./sec.

(vii) Wheel, axle and roller bearing arrangement is same as in standard ICF dc EMU bogie.

(viii) Braking system is exactly identical to existing coaches.

(ix) There is no change in installation of electrical equipment in motor coach bogie as compared to existing bogies.

2. In order to prove worthiness of these modified vehicles, detailed oscillation trials and confirmatory runs were conducted upto a maximum test speed of 90 kmph on Virar - Churchgate Sub-urban Section of Western Railway. Results of these tests as contained in RDSO Report no. MT - 140 indicate acceptable riding behaviour of test coaches in both empty and loaded (SDCL) condition upto a maximum test speed of 90 kmph.

3. Based on the result of these tests, it is certified that dc EMU coaches having ICF bogies retrofitted with pneumatic suspension as per Drawing no. DC/EMUT/ASR-0-0-001 and DC /EMUM/ASR-0-0-001 are fit for operation up to maximum speed of 80 kmph over such sub-urban sections of Western Railway and Central Railway where dc EMU stock is permitted subject to the conditions of track and bridges as given in para 3.1 & 3.2 below. All other conditions in this connection shall be same as applicable to the existing dc EMU stock.

3.1 Track

3.1.1 The track shall be to a minimum standard of 52 Kg. rails on sleeper to M+7 density and depth of ballast cushion below sleepers of 250mm which may consist of atleast 100mm clean ballast and the rest in caked-up condition, on compacted and stable formation.

3.1.2 For track of lower standard than that mentioned above, the Chief Engineer concerned shall decide the lower maximum permissible speed. 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.

3.1.3 The maximum permissible speed on curves shall be decided on the basis of the existing provisions of the Indian Railways Permanent Way Manual 1986.

3.2 Bridges

3.2.1 The clearance in regard to bridges refers to standard design of girders, slabs, pipe culverts, pier, abutments etc. issued by RDSO for BGML, RBG & MBG-1987 standard loading.

3.2.2 All other designs of super-structure and sub-structures are to be examined under the directions of the Chief Engineer concerned and certified by him in terms of current IRS Bridge Rules, Steel Bridge Code, Bridge Sub-structure and Foundation Code etc. read with up-to-date correction slips.

4. **General Conditions**

4.1 In a dc EMU train rake, coaches fitted with ICF bogies having retrofitted pneumatic suspension at secondary stage can be permitted to be intermixed with coaches having standard ICF all coil bogies for service trial purposes only.

4.2 It shall be ensured that ICF bogies having retrofitted pneumatic suspension shall be maintained as per following pamphlets:

i) Pneumatic Secondary Suspension - CMI no- 9802
ii) Remaining items - As per technical pamphlets already applicable for standard dc EMU stock.

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

4.4 3660mm (12' 0") wide dc EMU stock fitted with pneumatic suspension (retrofitment) at secondary stage is within maximum moving dimensions to RDSO Sk.74176 which has been running in the Mumbai sub-urban area for the past many years.

(P. Bhattacharya)
Executive Director Standard(Motive Power)

DA : Nil

Copy to :

1. The Secretary(Mechnical) , Railway Board, Rail Bhawan, New Delhi..
2. The Secretary(Engg./G), Railway Board, Rail Bhawan, New Delhi.
3. The Secretary(Elect.) , Railway Board, Rail Bhawan, New Delhi.
4. The General Manager(Mech./operating /Electrical) :
   (i) Central Railway, Mumbai , CST.
   (ii) Western Railway, Churchgate, Mumbai,

P. Bhattacharya
(P. Bhattacharya)
Executive Director Standard(Motive Power)

EMU(ras)

Mr T.S.B. Singh, Chief Bridge Engineer
Mr Deo - 22130, XEN (Design)
Mr Meena 22111, 2097406, Dy CE/Bridges.

G.M. Engineering W. Rly ccs handed over personally by ... Copy of oscillation trial report is required for perusing the case

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पश्चिम रेलवे/Western Rly.
प्रधान कार्यालय, चर्चगेट
Hd. Quarter's office, Churchgate.
17 NOV 1998
मु. लिपिक (प्रा. और वे.) मु.
Head Clerk (G. & D.) Main

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