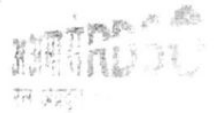




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No. EL/DSE4/MELP

Date: 20.04.2017

M/s Madhepura Electric Loco Pvt. Ltd.,
601-B, 6th floor, Tower-1,
Konnectus Bhavbhuti,
Near minto Bridge,
New Delhi-110 001

Sub: Minutes of the design review meeting held at RDSO on
11/12.04.2017 relating to Madhepura Electric Locomotive Factory
Pvt. Ltd.

Design review meeting relating to Madhepura Electric Locomotive Factory
Pvt. Ltd was held at RDSO in chamber of Director/Computer with representatives
of M/s Alstom on 11/12.04.2017. Following members were present during the
meeting:

RDSO (S/Shri)

M/s Alstom (S/Shri)

Mohit Sonakiya, DSE/C&S

Somenath Moulick

U. B. Yadav, SSE/D/Elect

Rajeev R

Gurpreet Kalra

Krishna

The minutes of the meeting is being enclosed herewith for kind information and
necessary action please.


(Mohit Sonakiya)

Encl: Copy of Minutes of the Meeting

for Director General/ Electrical

Copy to: DSE/TPL: for kind information please.

Minutes of Meeting held at RDSO on 11.04.2017 & 12.04.2017

A meeting was held at RDSO on 11.04.2017 & 12.04.2017 with representatives of M/s Alstom. During the meeting, the points raised by RDSO on design documents for bogie, car body, crashworthiness & coupler were discussed.

1. Bogie system

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/3.1.35/24 dated 30.03.2017:-

1. Para b-i: M/s Alstom have revised the document replacing wheel diameter to wheel tread profile as desired by RDSO.
2. Para b-ii: M/s Alstom were once again advised to perform the thermal calculation for braking to stand still from initial speed of 120kmph for both 22.5t and 25t axle load. Drag braking as per EN-13979-1 should also be considered while evaluating thermal load.

As per revised document, M/s Alstom considered only point load on tread during FEA of wheel. However, thermal loading has not been taken into account. RDSO normally follows AAR S-660 standard for load cases to evaluate thermo-mechanical performance of wheel. Sample report was shown to M/s Alstom. M/s Alstom agreed to incorporate thermal loading to validate the design of wheel.

3. Para b-iii: M/s Alstom have submitted FEA of axle box. M/s Alstom informed that the load case include brake forces. The loads have been taken in accordance with UIC 615-4 and EN 13749. RDSO requested the firm to provide a copy of UIC 615-4 and EN 15827.
4. Para b-iv: M/s Alstom have still not included details of gear & pinion in the documents. However, it was informed that they have compiled the data and would submit it in the revised document. The calculations for all load cases have not been submitted. M/s Alstom during discussion informed that they have done the analysis for the worst case. It was advised that the torque and rpm data related to Traction Motor for A, B, C & D load cases as shown during the meeting should be provided and root and flank safety factors.
5. Para b-v: M/s Alstom have shown radius of transition zones like journal and collar bearing surface, collar bearing surface and wheel set etc. in revised drawing of axle. However, EN 13104 has not been followed for diameters as well as ratios between the wheel seat & axle body diameters. M/s Alstom were mentioned that it is not possible to maintain axle geometry as per EN, to fit AAR bearing. M/s Alstom were advised to submit comparison for EN & AAR standard in this regard. It was also advised to incorporate the reasons in case a particular clause of EN is not being followed duly correlating it with AAR standard reference.

6. Para b-vi: M/s Alstom was told that the calculation sheet could not be followed in absence of any explanatory notes. The calculation of P1 was checked with Alstom and result did not match the document. M/s Alstom agreed to recheck the calculation given for axle strength as well as incorporate explanatory notes to understand the calculations. Description of L1, L2, D, d, k, r, l/v etc would also be added in the document for axle strength calculation. M/s Alstom also informed that EN only has the formulae for Standard Gauge and the same has been used as it would result in worse case for Broad Gauge. RDSO advised that the reasons for using Standard Gauge formulae instead of Broad Gauge may be provided in the document itself.

B. In addition to the above following points were advised to M/s Alstom:

1. The bogie load case document submitted did not have a load case for wheel floating. Firm informed that no deformation would result in bogie frame during running of the locomotive when wheel is floated into trolley. It was advised to submit details supporting the assumption.
2. Explanatory notes are needed for Bogie Frame Load cases and values used e.g. significance of K values used in calculations in section C 1.1. Also, data in B.3 should be referenced. why axle assembly +0.6*motor reductor group weight is computed? Is it unsprung mass ?
3. M/s Alstom were requested to provide following EN/UIC/ISO standard referred in design documents:
 1. UIC 615-4, 2nd edition of Feb'2003
 2. UIC 510-5 latest edition
 3. ISO-281 & ISO 76 latest edition
 4. EN 13749, edition of July 2011
 5. EN 15085-3, December 2007
 6. EN 15827 latest edition
 7. EN 15663 latest edition
4. The L10 life calculation for bearings is performed as per SNCF-12602 document. Static and dynamic load rating, safety factor and L-10 life calculation based on ISO: 281 & ISO: 76 are required as per PCMA.
5. The loads e.g. bogie weight etc are not same in different document like Axle strength calculation, L10 calculation for bearings, FEA of bogie frame and axle box housing. It was advised that they should be properly cross-referenced so as to ensure consistency. M/s Alstom agreed to correct this discrepancy.
6. Cannon box and TM bearings are dealt by DSE/TM and M/s Alstom was advised to discuss these documents with TM group.

7. M/s Alstom were requested that cross reference should be mentioned in the beginning of all calculation wherever mentioned in the document to help in scrutinize the document. It is advised to furnish some explanatory notes for calculations so as to enable RDSO to follow the calculations.

2. Car-body

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/3.1.35/24 dated 03.03.2017:-

1. Para 4.1- M/s Alstom have submitted copy of EN-15085. The reference to DTRF 150209 document has been removed and relevant extract has been reproduced in the revised document shown during the meeting. However, there were references to other Alstom document regarding "CLASSIFICATION OF RAILWAY VEHICLE PARTS ACCORDING TO THEIR SAFETY LEVEL". M/s Alstom agreed to revise all such occurrences before submitting the document.
2. Para 4.2- Clarification sought by RDSO on load cases document no. NHD0000266534 Rev. 0 dated 26.09.2016 have been received through M/s Alstom letter no. MELPL-IR_PCMA-2017-194 dated 15-02-2017. Reference of load cases have been linked in revised FEA report for car body shown during meeting.
3. Para 4.3- The properties of material SS 301L is yet not mentioned in the table even though they have been included elsewhere. M/s Alstom told that it was due to oversight and shall be corrected.
4. Para 4.4- M/s Alstom have revised the FEA document, introducing corrections in case of plastic deformation using Neuber's rule and accordingly shown that the UTS is not exceeded in all exceptional load cases.
5. Para 4.5 - As per the document 10.4% Plastic Strain has been observed locally. No acceptance criteria are provided. M/s Alstom was advised to provide acceptance criteria for plastic strain as well as guidelines for considering strain as local.
6. Para 4.6 - M/s Alstom have revised the documents of load cases and FEA including cattle guard as advised by RDSO and informed that these would be submitted in a week.

B. In addition to the above following points were also discussed:

1. Detailed FEA report of only load cases as per RDSO specification has been submitted. However, FEA results for load cases as per EN standard as well as Alstom Document No. NHD0000266534 dated 26.09.2016 to be submitted.

2. Acceptable limit for hourglass energy need to be mentioned in design document.
3. The analysis of crashworthiness has used Hollomon Model for characteristics for elastic members of car body. More details should be provided in this regard.
4. Acceptance limits for values may be provided in design documents as per relevant standard to help evaluate the design.

3. Coupler

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/3.1.35/24 dated 03.03.2017:-

1. Para 5.1 - M/s Alstom are not providing RDSO approved couplers. M/s Alstom were advised to use standard AAR couplers which are in use on Indian Railways to save time in design review. However, M/s Alstom stated that the requirement of draft gear capacity in their design is much higher than that available for RDSO approved couplers and therefore, they are using a new design based on their experience with modification to the coupler head to suit AAR standards. They also stated that according to AAR policy, firm cannot get AAR approval for supplies outside North America.

B. In addition to the above following points were also discussed:

1. M/s Alstom mentioned that special Yoke design to accommodate the High Energy Draft Gear Integrated in Coupler as per AAR M-211.
2. M/s Alstom were requested to submit Coupler Validation Plan.

4. Crashworthiness

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/3.1.35/24 dated 03.03.2017:-

1. Para 5.2 Based on the discussions, RDSO agreed to examine the crashworthiness documents based on the coupler design provided by M/s Alstom. However, it was made clear to M/s Alstom that this would be subject to the approval of the design of coupler after validation.

B. In addition to the above following points were also discussed:

1. M/s Alstom were advised to provide minimum height of cattle guard after deformation in case of any accident as RDSO informed that in certain situations the cattle guard nose may come down and infringe MMD after deformation.