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No. EL/DSE4/MELP

Date: 31.05.2017

M/s Madhepura Electric Loco Pvt. Ltd,
601-B, 6 floor, tower-1,
Konnectus Bhavbhuti,
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New Delhi- 110 001

Sub: Minutes of the design review meeting held at RDSO on 18.05.2017 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 / C&S with representatives of M/s Alstom on 18.05.2017. Following members were present during the meeting:

RDSO (S/Shri)

M/s Alstom (S/Shri)

Pratibha Gupta, JDSE/C&S

Rakesh

U. B. Yadav, SSE/D/Elect.

Rema

Rajiv Kumar, JE/D/Elect.

Rajeev

Gurpreet Kalra

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


(Pratibha Gupta)
for Director General/Electrical

Encl: Copy of Minutes of the meeting.

Copy to: DSE/TPL for kind information please.

Minutes of Meeting held at RDSO on 18.05.2017

A meeting was held at RDSO on 18.05.2017 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/DSE4/MELP dated 20.04.2017:-

1. Para A-2: M/s Alstom have performed the thermal calculation for braking to stand still from initial speed of 120kmph for both 22.5t and 25t axle load as desired by RDSO. M/s Alstom have performed drag braking calculation as per EN-13979-1. M/s Alstom mentioned that thermo-mechanical performance of wheel has been evaluated as per EN standard and combination of stress has not been considered, RDSO advised firm to furnish the details of stress at temperature specified in the FEA of wheel thermal calculation report and material properties variation with temperature.

RDSO once again advised to firm to conduct thermo-mechanical analysis of wheel in accordance with AAR S-660. Also, heat capacity of wheel needs to be submitted.

2. Para A-3: M/s Alstom has still not submitted UIC 615-4 as required to review the FEA report of axle box submitted by the firm. Firm stated that it is in progress.
3. Para A-4: M/s Alstom have included details of gear & pinion in the revised documents as desired by RDSO. However, M/s Alstom have considered only worst case scenario for load cases during calculation. RDSO advised firm to furnish calculation for all 4 (A, B, C & D) loading cases.
4. Para A-5: M/s Alstom have modified the drawing to indicate 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 have submitted comparison for EN & AAR standard and justification regarding inability to maintain axle geometry as per EN, to fit AAR bearing.
5. Para A-6: M/s Alstom submitted detail explanation on axle strength calculation report as per the earlier discussion with RDSO. M/s Alstom have given explanatory notes for calculation for P1 & P2 values. Descriptions of L1, L2, D, d,

k, r, l/v etc .have also been mentioned in the revised document. M/s Alstom stated that EN only has the formula to standard gauge and same has been used. As advised by RDSO, M/s Alstom has mentioned the reason for using standard gauge formula instead of broad gauge in revised document submitted.

6. Para B-1: M/s Alstom has submitted the report on wheel floating arrangement with trolley. But the design of trolley has to be submitted. Details of load case on the bogie frame due to wheel floating arrangement with trolley are also to be given.
7. Para B-2: M/s Alstom provided bogie frame FEA test specification document no. SEF-12-00070770 to clarify K value details and distribution of motor weight on axle and frame which is 60% & 40%.
8. Para B-3: M/s Alstom has still not submitted following standard as asked in meeting on 12.04.2017.

UIC 615-4, 2nd edition of Feb'2003

UIC 510-5 latest edition

ISO-281 & ISO 76 latest edition

EN 15085-3, December 2007

EN 15827 latest edition

EN 15663 latest edition

9. Para B-4: M/s Alstom have submitted the L10 life calculation & dynamic load rating for bearings as per ISO: 281. RDSO advised to submit calculation for static load rating required as per PCMA based on ISO: 76. Also to mention safety factor in the document.
10. Para B-5: M/s Alstom have cross-referenced load e.g. bogie weight taken in different document to ensure consistency.
11. Para B-6: M/s Alstom informed that they have submitted documents of Cannon box and TM bearings to DSE/TM.
12. Para B-7: M/s Alstom have mentioned reference in explanatory notes for calculations and the documents.

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

1. M/s Alstom has confirmed that dynamometer test will be carried out to test the brake block and wheel behavior in presence of RDSO representative at the time of bogie testing to validate the thermo-mechanical strength of Wheel.

2. Car-body

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/DSE4/MELP dated 20.04.2017:-

1. Para A-1: The references to Alstom document regarding "CLASSIFICATION OF RAILWAY VEHICLE PARTS ACCORDING TO THEIR SAFETY LEVEL" has been removed and relevant extract has been reproduced in the revised document.
2. Para A-2: M/s Alstom have linked reference of load cases in revised FEA report for car body.
3. Para A-3: M/s Alstom have mentioned the properties of material SS 301L in the table.
4. Para A-5: As per the document 10.4% Plastic Strain had been observed locally. No acceptance criteria were provided. M/s Alstom is again advised to provide acceptance criteria for plastic strain as well as guidelines for considering strain as local.
5. Para A-6: M/s Alstom had submitted documents of load cases and FEA including cattle guard.
6. Para B-1: Detailed FEA report of only load cases as per RDSO specification has been submitted. M/s Alstom advised to submit summary of FEA results for load cases as per EN standard as well as Alstom Document No. NHD0000266534 dated 26.09.2016.
7. Para B-2: M/s Alstom have mentioned acceptable limit for hourglass energy in soft copy of revised document shown during the meeting. However, signed revised document are awaited.
8. The analysis of crashworthiness has used Hollomon Model for characteristics for elastic members of car body. M/s Alstom have described 'Hollomon Model' in design document as requested by RDSO.
9. Para B-4: Acceptance limits for values may be provided in design documents as per relevant standard to help evaluate the design.

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

1. M/s Alstom stated that sole bar deformation shall be less 1.5 mm per meter and this shall be included in FEA document.
2. Roof panels (Doc. No. NHD0000266390): M/s Alstom clarified that roof is three parts Poof 1, 2 & 3 which can be handle separately. M/s Alstom advised to submit details regarding water proofing of roof. Lifting tackles are needs to be provided on roof to lift the roofs, same needs to be include in design report.

3. M/s Alstom advised to update acceptance criteria for the modal analysis in strength and vibration analysis report of underframe (document No. NHD0000266357 Rev. 0).

3. Coupler

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/3.1.35/24 dated 20.04.2017:-

1. Para A-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. Approval of new make of draft gear and coupler is subject to prototype test.
2. Para B-1: M/s Alstom mentioned that special Yoke design to accommodate the High Energy Draft Gear Integrated in Coupler as per AAR M-211.
3. Para B-2: M/s Alstom have showing Coupler Validation Plan. However Fatigue test and vertical swinging is not provided in the same as AAR M 211. M/s Alstom agreed to include these tests in validation plan of coupler and accordingly revised document will be submitted.

4. Crashworthiness

A. Points highlighted during meeting with Alstom for which MoM were issued vide RDSO letter no. EL/3.1.35/24 dated 20.04.2017:-

1. Para A-1: 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 prototype test and validation of characteristic used in the calculation.
2. Para B-1: M/s Alstom have shown max. deflection of cattle guard nose after deformation in case of any accident in soft copy of document shown during the meeting. M/s Alstom also told that the minimum height of cattle guard nose after deformation will be higher than 102mm (As per requirement of MMD). Revised design document yet to be submitted.

5. Lighting

1. Head Light (Doc. No. NHD0000266355):

A. Following points have been discussed with M/s Alstom during the meeting held at RDSO on 18.05.2017

i. M/s Alstom are not providing twin beam head light as per RDSO specification. Approval of design is subject to result of prototype test.

ii. Following details are also required:

- a. Complete design and schematic diagram of proposed headlight along with performance of the same if being used elsewhere.
- b. Input voltage range.
- c. Colour temperature of LED light and Colour Rendering Index (CRI) details.
- d. Details of driver for LEDs.
- e. Surge protection & reverse polarity protection.
- f. Arrangement for focusing and beam alignment.
- g. Lux at 8 meter and beam angle should be specified.
- h. Technical data sheet of LED to be provided.
- i. Color temperature should be specified.
- j. Rated Lumen Maintenance Life (LM-80) needs to be specified.
- k. Front glass thickness, Impact resistance.

2. Marker Light: Following details needs to be submitted by the firm.

- a. Complete design and schematic diagram.
- b. Lux at 1 meter and 3 meter to be specified.
- c. No. of LEDs.
- d. Power consumption of marker light.
- e. Technical Data sheet of LED.
- f. Dominant wave length & Luminous intensity of Red LED & White LED at 20 mA.

3. Flasher Light:

- a. Complete design and schematic diagram of light needs to be submitted.
- b. Technical Data sheet of LED is required to be submitted.

6. Cab Air Conditioner (Doc. No. NHD0000266343):

A. Following points have been discussed with M/s Alstom during the meeting held at RDSO on 18.05.2017.

1. M/s Alstom has to give calculation details for cooling capacity, as only value of the same is given in document.

2. M/s Alstom advised to specify power supply variation, cab temperature during cooling and heating mode, Cut-in and Cut-off rating of high pressure & low pressure of compressor.
3. No protection for over heat (during heating mode) is mentioned in the documents. M/s Alstom was told to provide details of overheat protection.
4. M/s Alstom advised to specify technical details of Ingress protection (IP) for Condenser motor, blower motor and Control panel.
5. Only photo of air duct has been provided. M/s Alstom advised to give detailed drawing of air duct with location of fresh air discharge.

