Reasoned Document for Amendment of Technical Specification No. TI/SPEC/OHE/MRI/0140, (March, 2016) for Measuring and Recording Instrumentation (MRI) to be Retrofitted on 8-Wheeler Tower Cars:

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1.	2.1	The instrumentation shall be able to measure and record the required parameters in the speed range 0-110kmph, when running in self-propelled mode/coupled to a train.	East Coast Railway	Speed range should be 0-160 kmph as High Speed trains has already been introduced in Indian Railways and in future high speed tower cars may be introduced.	Not accepted. Since MRI system is to be retrofitted on existing 8WDETC running at the speed of 110 kmph.	No change.
2.	2.2	… Processed report of OHE geometry from the on-board computer to the nominated Railway Official sitting at the Remote Control Centre through internet shall be transmitted. The type and details in Report shall be finalized at the designs approval stage.	East Coast Railway	Processed report of OHE geometry from the on-board computer to the nominated Railway Official sitting at the Remote Control Centre through internet/or web server shall be transmitted.	Not accepted.	No change.
3.		Format of reports.	East Coast Railway	Different format of reports as per requirement of Railway should be supplied to the tenderer by Railways so that the same can be incorporated in the programming by the tenderer.	Not accepted. Since this May lead to use of non-standard format across Railways. Regarding format of report refer clause No. 2.8.2 of Spec.	No change.
4.	1.11	Training: The Contractor shall arrange to provide training in operation & maintenance of the instrumentation at their	East Coast Railway	A point should be added in the tender that the tenderer should trained the Railway officials (Zone wise) regarding operation & normal	The Training in operation & maintenance is mentioned in clause No. 1.11.	No change.

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		manufacturing works for two men for four days and two men for four days at user place for each set of instrumentation supplied for each Tower Car. The training material shall be supplied by the contractor. (This clause is indicative. Please refer tender conditions in the tender document for details.)		maintenance of the equipments with practical training.	(However, this clause is indicative. Please refer tender conditions in the tender document for details.)	
5.		General	East Coast Railway	Provision of CCTV camera on 8-wheeler tower cars for better reliability and safety point of view. 3 Nos. CCTV cameras to be provided on 8-wheeler tower car, one camera is fixed on dome of the roof of the tower car pointing towards working platform to monitor the work of OHE maintenance gang, second & third cameras are to be fixed outside the front and rear cabs to see front and rear side images of the tower wagon. All these cameras are linked with PC monitor provided in both cabs. The images of the CCTV cameras shall be transmitted to	Not accepted as CCTV camera is beyond the scope of MRI specification. However, CCTV camera is provided on roof of 8WDETC towards working platform for monitoring of working gang activities, as per 8WDETC Spec.	No change.

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				the nominated Railway Official sittings through internet/or web server. By the above system, the tower wagon driver can see the work completion of working gang on roof of tower car at the particular working place so that he can move the tower car forward/reverse safely. The tower wagon driver can see the rear side images while driving in front cab and vice versa so that it will be easy and safe for the driver to drive with the other cab when one cab of tower car becomes defective.		
6.		General	East Coast Railway	Facility for online Ultrasonic scanning Eddy Current Testing of Contact wire 107/150 Sq. mm of Traction Over Head Equipment is to be incorporated.	Not accepted, since accurate ultrasonic testing is not feasible at the speed of 110 kmph.	No change.
7.	2.5	Paragraph: The pantograph of Tower Car may be fitted with instrumentation such as transducers, accelerometer, load cells and strain gauges etc. as required but such fitment	M/s ADJ Engg. Pvt. Ltd.	Pantograph shall have an easy replaceable skid. One of them will be used for wire wear measurement, another one-for voltage, shocks, force between pantograph and contact wire. It is also possible	The MRI system is to be retrofitted on existing 8WDETC, also, only one pantograph is mounted with existing 8-wheeler tower wagon and 8WDETC, hence	No change.

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		shall not materially affect the static/dynamic performance of the Tower Car pantograph. The sensors are preferably to be installed on the roof of car and non-contact measurement shall be preferred. The transducers shall be properly protected against mechanical, environmental and electrical interferences. The cameras shall have high resolution high frequency suitable for capturing of images at the specified speeds. The cameras and other equipment shall be protected for ingress of dust and water with IP -65 Protection. For parameters like contact wire height, stagger, loss of contact, setting distance (implantation) and thickness/diameter of contact wire, contact-less measurement system employing state of the art technology shall be acceptable conforming to environmental standards. The system shall be designed according to electromagnetic compatibility, Shocks		to use two pantographs simultaneously.	system design is to be done accordingly.	

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		vibrations and shall have no moving parts, completely sealed and rugged construction.				
8.	2.6.2	The electric supply shall be made available from ~~7.5 kVA~~ 10 kVA DG set, 440V, 3 phase supply provided with Tower car. The tenderer shall draw single phase supply from DG Set for supply to UPS. The UPS shall have a backup of at least 3 hours in the event of failure of DG Set. The capacity of battery with UPS shall be furnished while submitting the design for approval of RDSO.	M/s ADJ Engg. Pvt. Ltd.	We would kindly request to reduce backup time to 1 hour, as 3 hour of the UPS capacity is about 200 kg of batteries, which will be heavy, expensive and need regular servicing. The fault of the DG set is not a typical or standard event, it's probability is far less than 0.1%, so we still point the attention to that paragraph and ask to decease it's the amount of UPS-covered time to 20-30 minutes.	Not Accepted. Since UPS back up for 3 hours is for MRI equipment, hence there would no such heavy/bulky battery required.	No change.
9.	2.7	Parameter to be measured:	North Central Railway/ Allahabad	Parameters to be added: 1. Indication for OHE tension using induced voltage, may be provided inside the tower car. 2. Arrangement for measurement of gradient of contact wire, may be made.	1. OHE voltage sensing device already provided in 8WDETC. 2. Accepted. New clause is added for the measurement of Gradient of contact wire, as per NETRA Spec. No. TI/SPC/OHE/NETRA/ 0140 Rev.2 (July,	New Clause: Clause No.-2.7-(f): Gradient (slope)and relative gradient of the Contact Wire: "The gradient of the contact wire is the rate of change of height expressed in mm/m of distance. For relative gradient this may be calculated based on variation in height of contact wire and

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				3. Arrangement for pre-sag calculation of OHE, may be made.	2019). 3. Not accepted, since pre-sag calculation during maintenance is not done.	distance travelled. Alternately, contractor's design can also be considered, subject to meeting the requirements. The accuracy of gradient (slope) and relative gradient of the contact wire measurement should be minimum ±0.5 mm per 50 meter."
10.	2.7.1-(a)	Height of the Contact Wire: The height of the Contact Wire is vertical distance of its underside from the rail level and it varies from 4500 mm to 6500 mm. The height measurement should be corrected for car-body movement. Height of contact wire may be measured using any non-contact measurement methodology. The Car shall be able to measure heights of two contact wire of main line OHE and of Turnout OHE to ensure a gap of 50 mm at support points at obligatory structures(out of run OHE to be higher than main line OHE). This is essential to avoid pantograph entanglement with OHE. Continuous measurement	M/s ADJ Engg. Pvt. Ltd.	We would kindly ask to increase the sampling distance up to 30mm. This is enough for geometry measurement; nothing can happen at so small distance.	Not accepted. However, the accuracy shall be ±2 mm and sapling distance shall be 200 mm, keeping in view as mentioned in NETRA Spec. No. TI/SPC/OHE/NETRA/0140 Rev.2 (July, 2019).	Height of the Contact Wire: The height of the Contact Wire is vertical distance of its underside from the rail level and it varies from 4500 mm to ~~6500 mm~~ 7570mm. The height measurement should be corrected for car-body movement. Height of contact wire may be measured using any non-contact measurement methodology. The Car shall be able to measure heights of two contact wire of main line OHE and of Turnout OHE to ensure a gap of 50 mm at support points at obligatory structures(out of run

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		of main line and Turnout OHE is required at such locations. The accuracy of height measurement shall be minimum ± 10 mm. Sampling distance shall be ~~1000 mm~~ 20 mm.				OHE to be higher than main line OHE). This is essential to avoid pantograph entanglement with OHE. Continuous measurement of main line and Turnout OHE is required at such locations. The accuracy of height measurement shall be minimum ~~± 10 mm~~ ±2 mm. Sampling distance shall be ~~20 mm~~ 200mm.
11.	2.7.1-(b)	STAGGER OF CONTACT WIRE: Stagger is defined as the distance of the contact wire from the center-line of pantograph, measured transverse to the track. (Suitable cant compensation shall be made for transverse oscillations of the	M/s ADJ Engg. Pvt. Ltd.	We would kindly ask to increase the sampling distance up to 30mm. This is enough for geometry measurement; nothing can happen at so small distance.	Not accepted. However, the accuracy shall be ±5 mm and sapling distance shall be 200 mm, keeping in view as mentioned in NETRA Spec. No. TI/SPC/OHE/NETRA/ 0140 Rev.2 (July, 2019).	…The accuracy of stagger measurement should be minimum ~~±10 mm~~ ±5mm. Sampling distance for Stagger measurement shall be ~~500 mm~~ 200 mm.

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		locomotive/OHE car which affect the center line of the pantograph from the vertical). The system employed should enable measurement of stagger of two contact wires simultaneously (at overlaps and turnouts) upto a limit of ± 500 mm. The stagger of contact wire may be measured using any non-contact measurement method. The accuracy of stagger measurement should be minimum ±10 mm. Sampling distance for Stagger measurement shall be 500 mm.	North Central Railway/ Allahabad	Take on/Take off stagger with distance from Support also to be displayed.	Not accepted, Since location is variable according to track parameters. However, this can be checked during data analysis.	No change.
12.	2.7.1-(c)-	MEASUREMENT OF CONTACT WIRE THICKNESS (CONTACT WIRE DIAMETER): Thickness implies the diameter of Contact Wire. There are three sizes of contact wire i.e. 107 mm^2, 150 mm^2 and 193 mm^2 and their diameters are 12.24 mm,14.50 mm and 16.40 mm respectively. The condemning limits of their diameters are 8.25 mm, 8.25 and 9.75 mm respectively. The measurement of diameter of contact wire may be	M/s ADJ Engg. Pvt. Ltd.	We would kindly ask to increase the sampling distance up to 30mm. This is enough for geometry measurement; nothing can happen at so small distance.	Not accepted. However, the sapling distance shall be 100 mm, keeping in view as mentioned in NETRA Spec. No. TI/SPC/OHE/NETRA/0140 Rev.2 (July, 2019).	…Sampling distance shall be ~~20mm~~ 100 mm.

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		made using any non-contact measurement method. The accuracy of contact wire thickness 0measurement shall be minimum±0.2 mm. Sampling distance shall be 20 mm.				
13.	2.7.1-(e)-	MEASUREMENT OF SETTING DISTANCE (IMPLANTATION): Setting Distance is distance measured from centre line of track to the inner face of traction mast. This varies in the range of 2100 mm to 5000 mm. System should be able to measure the setting distance in accuracy level of ± 10 mm. System should be able to have Data storage of at least 10 lakh masts and transfer it for printing of reports.	M/s ADJ Engg. Pvt. Ltd.	We would kindly ask to increase threshold for accuracy up to ±35mm.	Not accepted. However, the range is modified upto 7000mm in place of 5000mm and the accuracy shall be remain ± 10 mm, keeping in view as mentioned in NETRA Spec. No. TI/SPC/OHE/NETRA/0140 Rev.2 (July, 2019).	… This varies in the range of 2100 mm to ~~5000 mm~~ 7000mm. System should be able to measure the setting distance in accuracy level of ± 10 mm.
			North Central Railway/ Allahabad	Arrangement for measurement of Implantation of Drop Arm of portal/TTC from track center may be made.	Not accepted, Since drop arm of TTC/portal is outside MMD limit.	No change.
14.		General	M/s ADJ Engg. Pvt. Ltd.	Sampling distance for height and wear are set as 20mm, while for stagger it remains 500mm. The very initial requirement for height was also 500mm, but then was changed on request of some competitor. According to our	Not accepted. However, sampling rates of relevant parameters are corrected keeping in view as mentioned in NETRA Spec. No. TI/SPC/OHE/NETRA/0140 Rev.2 (July, 2019).	No change.

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				experience we insist that 200mm sampling distance for height and stagger measurement no physical sense. The wire is rigid enough to avoid sudden changes of its geometry (except wear), so the recommended sampling step should be 200mm or 100mm. The step of 20mm causes increased requirements to the equipment and storage system, making the system much more expensive without any technical or physical reason for that.		
15.	2.10.4	Emission from Tower Car to outside world shall be limited to level specified under CENELEC standard 50121-2.The tenderer shall submit the simulated values of these interference currents in their offer.	Telecom Dte./ RDSO	The scope of EN 50121-2 states as reproduced below: ……"This European Standard specifies the emission limits of the whole Railway System to the outside world." …. Therefore, it is understood that this standard defines limits of "whole railway system to outside world" and not the limits of emission from rolling stocks. Further, this standard	Accepted. EN 50121-3-1 namely "Railway application - Electromagnetic compatibility Part 3-1: Rolling Stock-Train and complete vehicle." will be referred in the specification. New line is added accordingly.	Emission from Tower Car to outside world shall be limited to level specified under CENELEC standard 50121-2 and EN 50121-3-1 namely "Railway application - Electromagnetic compatibility Part 3-1: Rolling Stock-Train and complete vehicle. The tenderer shall submit the simulated values of these interference currents in their offer.

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				also refers to other standards as mentioned below: **EN 50121-1**: Railway applications- Electromagnetic compatibility Part-1: General **EN 50121-3-1**: Railway application - Electromagnetic compatibility Part 3-1: Rolling Stock-Train and complete vehicle. **EN 50121-3-2**: Railway application - Electromagnetic compatibility Part 3-2: Rolling stock apparatus. Therefore, considering the 8-wheeler tower car as a train and complete vehicle, the emission limit may be referred in the para as given in standard EN 50121-3-1 namely "Railway application - Electromagnetic compatibility Part 3-1: Rolling Stock-Train and complete vehicle." A decision in this regard may be taken at TI Dte. end in consultation with all concern.		