		Reasoned Document for WPMS	
	1	**2**	**3**
Clause	**Specification for WPMS Description**	**Firms Comments**	**RDSO Remarks**
1	**Introduction:**		
	Accurate and real-time monitoring of wheel profiles enables early detection of wear, abnormalities, and defects. This allows for proactive maintenance as well as the system contribute to cost-saving measures by optimizing maintenance schedules. It aligns with the global trend in rail transportation to adopt smart technologies that enhance the performance and reliability of railway networks. The system is dedicated to providing safe, reliable and cost-effective transportation services for Indian Railways. This specification covers requirements for design, development and supply of all-weather Wheel Profile Measurement System hereinafter referred as WPMS installed on trackside for inspection of wheel Profile as well wheel diameter and wheel gauge for IR wheels while in motion under their respective Rolling Stock. The system output expected include the following 1.1 The graphical presentation of Wheel Profile. 1.2 Wheel parameters. 1.3 Defect Detection based on Parameters indicated in Part B The specification is generic in nature and describes the technical and functional requirements while remaining technology agnostic. Vendors are free to select available state of art technologies as per industry practices at par with international standards to meet the requirements stipulated in the specification.	**COFMOW:** Note: The measurement and analysis components are to be distinctly separated. Hardware Requirements 1.1 The hardware component shall include equipment capable of measuring parameters such as root, tread, diameter, false flange, etc., as defined by the user. 1.2 The hardware shall be designed to incorporate the entire codal life within its functionality (AMC), ensuring long-term reliability and compliance. 1.3 Billing for the hardware component shall be raised separately from the software component. 1.4 The hardware should provide options for users to choose between manual input and RFID integration for data linking. 1.5 Users will define the measurement format, which could be either an online Excel file or a CSV file. Conclusion: This separation of hardware and software components allows users to have full control over defining wheel measurement parameters and customizing the analysis, ensuring flexibility and ease of integration into their existing systems. Additionally, separate billing for hardware and software components provides transparency in costing. Benefits of the division of Hardware & Software: 5.1 Customization: Users gain precise control over measurement parameters, analysis configurations, and output formats. 5.2 Adaptability: The modular approach caters to diverse work environments, ensuring robust hardware performance and flexible software adjustments. 5.3 Scalability: Separate billing enables independent upgrades, future-proofing the system for evolving needs. 5.4 Efficient Integration: Streamlined integration into existing systems, allowing users to tailor automation levels to their workflow. 5.5 Cost Management: Clear separation of billing for hardware and software components facilitates transparent cost management and budget allocation. **Novious:** Ok **Premier India Agencies:** Clarification required. Although the specifications are generic in nature, we find that some of the technical clause are suiting one particular manufacturer.	**COFMOW:**- 1.1 This is a new system further, that may incorporate embedded software and Cross platform integration of Hardware and Software may not be possible due to proprietary softwares. 1.2 At present Codal life of the system is undecided being the first of its kind system in IR. 1.3 This kind of automated system is being installed for the first time in IR. So software of a firm may be dedicated for there system only. Hence billing for hardware and software can not be raised separately. 1.4 Manual overwrite access to missed RFID information shall be included. It is included in para 4.14 1.5 This is already included in Para 7.3 **Premier India Agencies:** The specification is technology agnostic. Specific clauses have not been reported for attention / redressal
2	**Scope of supply:**		

2.1	The WPMS systems shall be supplied and installed on turnkey basis by OEM and/or their trained authorized personnel. The scope of supply shall include:	**Premier India Agencies:** Comply. No comments	
2.1.1	Sensors for Train Detection	**NEXTSENSE:** Based on axle counter or trigger? **Novious:** Is it mandatory to have a separate sensor for train detection? **Premier India Agencies:** Comply. No comments.	**NEXTSENSE:** Prospective suppliers may decide their own mechanism for train detection and system activation/ deactivation. **Novious:** Not mandatory to have separate sensor. Some mechanism for train detection and system activation/ deactivation is required.
2.1.2	WPMS site Equipment for profile measurement along with an integrated RFID reader	**NEXTSENSE:** Reader need to be supplied by supplier of WPMS, tags supplied by customer? **Novious:** Currently is it needed to have reader or only provision for integrated RFID reader is needed for now **Premier India Agencies:** Comply. No comments	**NEXTSENSE**: Yes, Reader need to be supplied by supplier of WPMS and tags are already available in rolling stocks. Integration of RFID reader with the supplied WPMS system is a requirement **Novious**:RFID reader is needed for identification of Vehicle/rolling stocks.
2.1.3	Concomitant accessories for alarms, computer, servers, Power and Data Cables etc.	**Premier India Agencies:** Comply. No comments	
2.1.4	Spares for normal maintenance	**NEXTSENSE:** Has to be specified - for which timeframe? **Novious:** Duration of maintenance **Premier India Agencies:** Comply. No comments	**NEXTSENSE:** Spares during Warranty and Comprehensive AMC period as given in Para 11. **Novious:** Maintenance schedule will be provided by OEM.
2.1.5	Maintenance tool kit with periodic calibration accessories: For every 10 systems or part thereof, one calibration and validation tool kit should be supplied by the supplier.	**COFMOW:** May clarify if the calibration tool kit requirement (2.1.5) of "For every 10 systems or part thereof" refers to every 10 individual components or every 10 complete WPMS systems to avoid ambiguity. In addition, mention of periodic calibration is there but periodic calibration from approved third party certification agencies may also be considered as an extra layer of safety. **SWASTIK OVERSEAS /RIFTEK REMARKS:** It's better to have calibration kit for each system. **Novious:** What if order is for less than 10 systems **Premier India Agencies:** Comply. No comments	**COFMOW:** Clause is modified to supply maintenance and calibration accessories for every WPM system. **Swastik/Riftek:** Clause is modified to supply maintenance and calibration accessories for every WPM system. **Novious:** Clause is modified to supply maintenance and calibration accessories for every WPM system.

2.1.6	System Literature: Operating, Maintenance Trouble Shooting instruction and all calibration/ sensor certificates in original	**COFMOW:** System Literature (2.1.6): May consider specifying a requirement for training sessions (free of cost) or/and additional documentation to facilitate effective system use, in addition to the provided operating, maintenance, and troubleshooting instructions. **Premier India Agencies:** Comply. No comments	**COFMOW:** Training requirement is already mentioned in para 12. Added new para 2.1.11 in scope of supply.
2.1.7	Material, as required for civil engineering work	**NEXTSENSE:** Should be specified more precisely **Premier India Agencies:** Comply. No comments	**NEXTSENSE:** It is already mentioned in clause no. 15.9
2.1.8	Site safety apparatus and tools & plants required for functioning calibration and maintenance.	**COFMOW:** Site Safety Apparatus: More specifics on the types of safety apparatus required (2.1.8) would be beneficial. This ensures that the supplier provides all necessary safety equipment, reducing the risk of any oversights. **Premier India Agencies:** Comply. No comments	**COFMOW:** Safety requirments are already mentioned in clause no. 8
2.1.9	Purging and/or cooling system as may be required.	**NEXTSENSE:** We provide a chiller and (if needed) a larger compressor will be provided **Wabtec:** Purging and cooling serve two different purposes functionally and hence are not interchangeable. Please delete 'or' from this clause **RT VISION Technologies Pvt. Ltd.:** Purging ~~and~~/or cooling system as may be required. Consignee some time may interpret as both purging and cooling required. **Premier India Agencies:** Comply. No comments	**NEXTSENSE:** Individual system can not be commented at this stage. **Wabtec:** The term"and/or" means system required both or any one for smooth functioning. **R T Vision:** "and/or" means both or anyone as may be required. No further clarification is required.
2.1.10	Any other accessory/component/system(s) essentially required for proper functionality of the equipment.	**Premier India Agencies:** Comply. No comments	
	Part-A		
	General Requirement for Equipment		
3	**Installation and Site Selection Criteria:**		
	Installation of the system should be done by supplier. Following General requirements/ guidelines for the site may be agreed to unless otherwise agreed to between consignee and Supplier		

3.1	The system is intended to be used at coaching depots and the location of the system should be selected in consultation with consignee (IR). The site requirement would be considered under:	**Novious:** Only coaching depots..? workshops and wagon yards should also be included	**Novious:** Clause is revised to include rolling stock depot.
3.1.1	Minimum 15 meters Straight and level track on either side of equipment	**Novious:** Mention speed limit / restriction also in site requirements **Wabtec:** For achieving best results, the minimum straight and level track on either side of the equipment should be 100 meters. RDSO requested to revise accordingly. **Premier India Agencies:** Comply. No comments	**Novious:** Operating speed is already mentioned in clause no.4.1 **Wabtec:** In rolling stock depot it is very difficult to get 100 m straight and levelled track at depot heads. System may be designed as per requirement stated
3.1.2	Away from switches and transition zones	**ApnaTech:** Also away from the washing area, and before the auto lubrication, if these are installed **RT VISION Technologies Pvt. Ltd.:** Away from switches and transition/braking zones. Braking can cause error in readings **Premier India Agencies:** Comply. Preferably on straight track	**ApnaTech , RT Vision, Premier:** Since several depots have a common Washing cum examination lines, it shall not be possible to avoid proximity to the washing area. As such Ingress Protection has been sought in Para 4.4, 4.5 & 4.6. As mentioned in para 4.1, system should work for speed range of 5 to 30 kmph.
3.1.3	Track structure should be stable and well maintained with proper drainage system.	**Premier India Agencies:** Comply. No comments	
3.1.4	Site should be preferably within 200 meters from the main power distribution box. In case the distance of power distribution box is more than 200 meter from the installation site, the power cable shall be arranged by consignee.	**COFMOW:** May clarify an acceptable distance beyond which it won't be permissible to install the site (3.1.4) to avoid ambiguity. Furthermore, detailed specifications for the main power distribution box must be outlined. This includes explicit information on the installation process, specifying whether it pertains to the existing railway distribution box or if a new distribution box will be installed by the contracting firm. **CWE/ECR/Hajipur:** Para 3.1.5 (new clause) "Supplier shall visit the location and finalise the location with the consent of consignee. As per site conditions, a GA drawing shall be prepared by the supplier and to be got approved by the consignee." **Premier India Agencies:** Comply. No comments	**COFMOW:** A new clause 3.1.5 is added. **ECR/HJP:** A new clause 3.1.5 is added.

3.2	Civil engineering and other allied works (if required) such as foundation for suitable enclosure/hut to accommodate UPS, batteries, electronic and electrical equipment, power system etc.; grouting supports for steel enclosures/equipment, control box, battery box etc., necessary work e.g. trench etc. for power and data cables shall be carried out by the system supplier. Adequate space and permissions where necessary may be provided by consignee.	**Premier India Agencies:**OK No comments	
3.3	The system shall not infringe IRSOD and shall be installed in consultation with authorized Railway Engineer.	**Premier India Agencies:** Comply. No comments	
3.4	The instrumented area shall be maintained manually with proper demarcation under the guidance of engineering supervisor.	**Wabtec:** Please clarify that the maintenance of the tracks is in the scope of Indian Railways, and not the supplier. Demarcation of the instrumented area to be provided by the Supplier. **Premier India Agencies:** Comply. No comments	**Wabtec:** Clause is revised.

3.5	AC power 230V, 50 +/-3Hz. shall be made available at main power distribution box by consignee. From this point the tenderer shall bring power supply to the site of installation by laying suitable power cable. The maximum load on the power supply system should not exceed 10 KVA.	**NEXTSENSE:** We recommend 400 AV 50 Hz with 3 phases with max 10KVA **Mermec/Vista:** The requirement of max 10kVA power seems a little underestimated, considering that the system would be installed in harsh environment mentioned in para 4.7. Please note that the system would need a temperature control system and compressed air for self-cleaning. We would suggest raising this limit to 20kVA. **Proposed content of new provision:** AC power 230V, 50 +/-3Hz. shall be made available at main power distribution box by consignee. From this point the tenderer shall bring power supply to the site of installation by laying suitable power cable. The maximum load on the power supply system should not exceed ~~10 KVA~~ 20 KVA. **Revised comment from Mermec:** The requirement of max 10kVA power seems a little underestimated, considering that the system would be installed in harsh environment mentioned in para 4.7. Please note that the system would need a temperature control system and compressed air for self-cleaning. We would suggest raising this limit to 20kVA. **Proposed content of new provision:** AC power 230V, 50 +/-3Hz. shall be made available at main power distribution box by consignee. From this point the tenderer shall bring power supply to the site of installation by laying suitable power cable. The maximum load on the power supply system should not exceed ~~10 KVA~~ 15 KVA. **SWASTIK OVERSEAS /RIFTEK REMARKS:** 3 Phase +N+E MCCB AND Isolator box is required. Maximum load on the power supply system should not exceed 12 KVA. **Premier India Agencies:** Comply. No comments	**NEXTSENSE, MERMEC, SWASTIK/RIFTEK:** Clause is revised.

3.6	UPS or alternate power back-up for at least 4 hours passed or 10 rake pass byes whichever is lesser with auto switch-over functionality shall be provided by the system supplier.	**NEXTSENSE:** 1.Currently 5 minutes for computer systems; suitable UPS with back-up time 4h for computer systems only. 2.not integrated yet, UPS serves the computer only **Mermec/Vista:** Please consider that the size of the UPS with batteries capable of powering the system (20 kVA) for 4 hours would be huge and will not be feasible. Only an alternate power backup in the form of DG set is feasible. **Proposed Content of new Provision:** ~~UPS or alternate~~ Power back-up for at least 4 hours passed or 10 rake pass byes whichever is lesser with auto switch-over functionality shall be provided by the system supplier. **SWASTIK OVERSEAS /RIFTEK REMARKS:** 2 hours backup without chiller, air and washing. We need to extend cabinet for bigger UPS to achieve 4 Hours. **ApnaTech:** Power backup of 4 hours at such a higher load requirement will need bigger space as well for power packs, which will be a concern. A power backup of 2 hours will be more feasible. **Wabtec:** Providing battery backup for a system with peak power requirement of ~10 KW will require a large battery bank with associated degradation, maintenance and replacement issues. It is requested that Indian Railways provide Auxiliary Transformer for primary source of power supply of WPMS and State Electricity Board power as secondary source of power. **RT VISION Technologies Pvt. Ltd.:** UPS or alternate power backup for at least 4 hours ~~passed~~ or 10 rake pass bye. Correction only **Premier India Agencies:** Partial comply. Additional cost (DMA standard UPS has 15 minutes runtime, time necessary to safety shut-down the system)	**NEXTSENSE, MERMEC, SWASTIK/RIFTEK,Apna Tech, Wabtec, RT VISION** Clause is revised. The 15kW requirement is a peak requirement and not continous requirment **Premier India Agencies:** Alternate power backup is necessary for continous running the system. **WABTEC**:This system is going to be installed in depots where regular power supply is likely available.
3.7	The internet and data connectivity should be provided for transfer of data, display of reports and audio-visual alarms from site of installation to centralized location as finalized by consignee.	**COFMOW:** Data transmission to the server must be conducted securely through any means. The firm bears the responsibility of ensuring data connectivity. **Novious:** Provision of separate internet and mobile internet feasibility is not possible at most of the times. Providing wired internet at site is not in hands of supplier, if necessary railway can take responsibility of wired internet provision. **Premier India Agencies:** Clarification required. Please confirm if in regular use the data connectivity to your control room will be provided by supplier. Please explain audio-visual alarms? Does SMS is ok?	**COFMOW:** It is already mentioned in clause no. 7.3. **Novious:** Different primary and stand by internet connection (wired/wireless) shall remain the responsibility of system supplier. **Premier India Agencies:** In railway control room data connectivity is already available. The audio-visual alarms means the system should be able to generate a audio-visual alarm at a location finalized by consignee. Only SMS is insufficient.

3.8	An alternate provision of mobile internet connection should also be provided in case failure of main internet connectivity. Suitable buffer storage for minimum 03 days of data should also be planned.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** modem for simcard. If its necessary system can be switch to mobile internet .we store data during 1 Month **ApnaTech:** Please clarify that in the event of no connectivity the Edge system to have a storage capacity to hold three days of data. As mentioned in clause 3.6 it is requested to mention the number of trains and the typical size of trains as data storage capacity depends on them and not the duration **Novious:** Provision of separate internet and mobile internet feasibility is not possible at most of the times. Providing wired internet at site is not in hands of supplier, if necessary railway can take responsibility of wired internet provision. **RT VISION Technologies Pvt. Ltd.:** Ideally it should be **10 days**. **Premier India Agencies:** Clarification required What is the meaning of mobile internet connection? Is it 5G SIM?	**Swastik/Riftek:**Individual system can not be commented upon at this stage. **ApnaTech:**The suitable buffer storage for minimum 03 days or 50 rakes of data is required. **Novious:**Provision of internet connection is responsibility of the supplier. **RT Vision:** The clause specified for storage for minimum 03 days **Premier India Agencies:** It can be 5G or 4G mobile SIM for interenet connection.
3.9	The recurring expenditure on mobile connectivity during warranty from the date of commissioning shall be borne by the supplier. Subsequent expenditure shall be borne as a part of CAMC by Indian Railways and paid as per actuals.	**Premier India Agencies:**Comply No comments	

3.10	Necessary mounting arrangement that can be easily disassembled within 02 hrs and reassembled within 05 hrs (Including time for calibration and validation). For this purpose, a notice should be sent to the concerned agency by the counterparty at least 24/48 hours in advance. Drawings of mounting arrangement of sensors should be submitted along with the proposal to consignee.	**NEXTSENSE:** For heavy track work (ballast renewal/rail exchange we need around 15 hours for disassemble and reassemble the system **Mermec/Vista:** Regarding disassembling time, are we talking of complete disassembly of the systems (track completely free) or just the optical detection units? 2 hours is quite a challenging time. We would suggest raising this value to 4 hours. **Proposed Content of New Provision:** Necessary mounting arrangement that can be easily disassembled within ~~02~~ 04 hrs and reassembled within 05 hrs (Including time for calibration and validation). For this purpose, a notice should be sent to the concerned agency by the counterparty at least 24/48 hours in advance. Drawings of mounting arrangement of sensors should be submitted along with the proposal to consignee. **SWASTIK OVERSEAS /RIFTEK REMARKS:** We recommend to have additional time 4 hours for disassemble and 7 hours for assemble. **ApnaTech:** 5 hours for reassembly along with calibration and validation is less. 7 hours should be given for all the mentioned activities **Novious:** Need- disassembled within 07 hrs and reassembled within 15 hrs (Including time for calibration and validation). Calibration and validation will take time. **Wabtec:** The scanner boxes can be disassembled within 02 hrs and reassembled within 05 hrs with enough labour. Calibration will need additional time. Traffic blocks to be provided by Consignee for disassembly and reassembly. Necessary mounting arrangement also technically includes the steel replacement sleeper. However, there is no requirement to remove this sleeper for track maintenance activities etc. Therefore, RDSO is requested to clarify accordingly and exclude steel tie/ sleeper from this clause. If RDSO expects the steel sleeper also to be removed, this activity will take multiple days. It is recommended that disassembly and reassembly of the system after commissioning and hand over to Indian Railways is separate line item with separate price for each instance in the tender. **Premier India Agencies:** Comply, this requirement is achievable under the following conditions: - Cables will be unplagged but not removed from the site. - The support steel frame fixed under the ballast will not be removed.	**NEXTSENSE, MERMEC/Vista, SWASTIK/RIFTEK, Apna Tech, Novious, Wabtec, Premier India Agencies:** The clause is revised.
4	**Operational Requirements:** The system should conform to following operational requirements		

4.1	**Operating speed:** 03 to 50 Kmph	**CWM/ PL WRIys:** Various Operating speed will result in variation in no. of rotation of wheel. At higher speed more length of circumference will come in exposure of sensors of WPMS compared to lower speed. **NEXTSENSE:** we provide highly accurate measurement results with operation speed of 05 - 30kmph **SWASTIK OVERSEAS /RIFTEK REMARKS:** Operating speed: 03 to 30 Kmph Note: AWPMS system to be install under the shed. **ApnaTech:** In the vicinity of the coaching depo's max speed is normally between 10-30 Kmph, hence it should be 03-30 Kmph **Novious:** Operating speed: 03 to 30 Kmph **Wabtec:** Optimal operational speed for Wabtec WPMS is 10-100 kmph. Beyond this range processing rate could be affected. RDSO is requested to increase the minimum speed requirement to 10 kmph. **Premier India Agencies:** To be amended, The system is to be installed in depot hence you will not achieve the speed of 50 kmph. Kindly amend the clause as 03 to 30 kmph.	**CWM/PL WRIys:** The System work within a fix distance. so covered distance shall remains constant. The variation in speed shall lead to the same distance around the circumference being covered in shorter time. **NEXTSENSE, Swastik/Riftek, Apna Tech, Novious, Wabtec, Premier India Agencies:** Clause is revised.
4.2	**Train length:** upto 300 Axles	**SWASTIK OVERSEAS /RIFTEK REMARKS:** Train length: Upto 150 Axles **Wabtec:** As stated in Clause 3.1, this WPMS system is intended to be used at coaching depots. Coaching trains are ~100 axles. Therefore, having a requirement of upto 300 axles in this clause is infructuous and may please be revised to 100 Axles. **Premier India Agencies:**Comply No comments	**Swastik/Riftek, WABTEC:** The System shall be capable for all type of rolling stock depot.

4.3	**Train headway:** 10 minutes between trains having upto 300 axles each.	**Wabtec:** As stated in Clause 3.1, this WPMS system is intended to be used at coaching depots. Coaching trains are ~100 axles. Therefore, having a requirement of upto 300 axles in this clause is infructuous. While it is feasible for WPMS to operate with 10 minutes headway for trains upto 300 axles, but it would result in a much higher cost for processing the data, and would also take longer for the alerts to be generated if the next train arrives while the alerts are being generated for the previous train. Therefore, RDSO is requested to revise the axles to 100. This Clause is to be read in conjunction with Clause 9.1.3 and 9.7 as there is an interplay between the headway and the time it takes to process the data and generate alerts. **Premier India Agencies:**Comply No comments	**Wabtec:** This time of 10 minutes have been revised considering clause 9.1.3 and 9.7. This is the functional requirement of IR.
4.4	**Degree of protection for electronics (embedded microprocessor system):** IP 66	**NEXTSENSE:** IP55 for cabinet, with additional shelter **SWASTIK OVERSEAS /RIFTEK REMARKS:** Degree of protection for electronics (embedded microprocessor system): IP 55 **ApnaTech:** The electronics are likely to include image servers housed inside a wayside panel. It should be adequate to mention the IP protection for the panel **Wabtec:** Electronics per se do not have any IP rating. It is the wayside enclsoure housing the electronics that is IP rated. In case of Wabtec's WPMS system, such wayside enclosure housing electronics is rated IP55. Wabtec has supplied >75 WPMS systems worldwide and operating for multiple years, including in tropical regions and the systems have never faced any issue with dust or water ingress in this enclosure. Please revise the IP rating to IP55. **Premier India Agencies:**Comply No comments	**NEXTSENSE, Swastik/Riftek, Apna Tech, Wabtec**: Clause is revised.

4.5	**Degree of protection for trackside/rail mounted sensors housed in enclosure:** IP 68	**NEXTSENSE:** IP65 **SWASTIK OVERSEAS /RIFTEK REMARKS:** Degree of protection for trackside/rail mounted sensors housed in enclosure: IP 67 **Novious:** With an IP68 rating, it is expected to be in water to a maximum depth of 1.5 metres for up to 30 minutes. 1.5 mtr immersion should not be expected with proper drainage mechanism, IP 66 or max IP 67 (waterproof) should suffice. **Webtec:** Please clarify what is meant by trackside/ rail mounted sensors. If this means the measurement optics/ lasers, then the Wabtec's rail mounted scanner boxes housing the measurement optics are rated IP66. Wabtec has supplied >75 WPMS systems worldwide and operating for multiple years, including in tropical regions and the systems have never faced any issue with dust or water ingress in the scanner boxes. Please revise the IP rating to IP66. **Premier India Agencies:**To be amended, IP65 minimum	**NEXTSENSE, Swastik/Riftek, Novious, Wabtec:**Clause is revised. Submergence of tracks is a possibility in depots and yards of IR

4.6	**Degree of protection for Measurement Optics:** IP 68	**NEXTSENSE:** IP65 **Mermec/Vista:** The requirements of having the measurement optics and trackside equipment IP 68 rating is not reasonable. IP 68 means water submersion for unlimited period of time; but we are talking of a wheelset measurement system which is not likely to measure trains underwater. We would suggest downgrading the requirement to IP 67 (which means compliant to temporary water submersion or flooding). **Proposed Content of New Provision:** Degree of protection for Measurement Optics: IP ~~68~~ 67 (Repeated Comment on 26.02.24) **SWASTIK OVERSEAS /RIFTEK REMARKS:** Degree of protection for Measurement Optics: IP 67 **Novious:** With an IP68 rating, it is expected to be in water to a maximum depth of 1.5 metres for up to 30 minutes. 1.5 mtr immersion should not be expected with proper drainage mechanism, IP 66 or max IP 67 (waterproof) should suffice. **Wabtec:** Wabtec's rail mounted scanner boxes housing the measurement optics/ lasers are rated IP66. In case of Wabtec's WPMS system, such scanner boxes housing the measurement optics are rated IP66. Wabtec has supplied >75 WPMS systems worldwide and operating for multiple years, including in tropical regions and the systems have never faced any issue with dust or water ingress in the scanner boxes. The risk of the site getting flooded should be addressed by selecting a suitable site that has minimal chance of flooding. Please revise the IP rating to IP66. **Premier India Agencies:**To be amended, IP65 minimum	**NEXTSENSE, MERMEC, Swastik/Riftek, Novious, Wabtec, Premier India Agencies:** Clause is revised.
4.7	**Ambient temperature range:** (-)10 to (+)55 Celsius	**Premier India Agencies:** Comply No comments	
4.8	**Relative humidity:** Up to 100%	**Premier India Agencies:** Comply No comments	
4.9	**Track Structure:** Rail Section and profile as per Para 203 of IRPWM, June 2020	**Premier India Agencies:** Comply No comments	

4.10	**Wheel Profile Measurement locations:** Data to generate 6 or more measurement per parameter should be collected from a minimum of 6 or more different locations around the circumference of the wheel covering at least 1 mete**r** of circumference length.	**CWM/PL WRlys:** Only 1/3rd of the circumference in being covered, hence possibility of defect being found is at around 33% of circumference. It should be more above 75 % so that at least 2.5 m of circumference is covered. **NEXTSENSE:** We guarantee 2 measurements per wheel at an angle of **85-90 degree**; linear distance between two measurements is a function of wheel diameter. **Mermec/Vista:** What's the use case behind this unique requirement? Which is the value for the end user? Why don't consider a statistical approach and build a wheel history (in more than 6 locations) using repeated passages of the same vehicle over time? **Proposed Content of New Provision:** Wheel Profile Measurement locations: Data to generate 6 or more measurement per parameter should be collected from a minimum of 6 or more different locations of the wheel ~~around the circumference of the wheel covering at least 1 meter of circumference length.~~ **Revised comment from Mermec:** Mermec/Vista: It is not feasible to cover 1 meter of circumference length with one set of optical sensor. With one set of sensors radial length of **0.5 meter** is covered with 80°radial angle and number of measurements distributed in entire 0.5 meter, Even with 01 meter length measurement of various parameters will depend on number of repeated transits (Measurements) and statistical approach, thus will not give any addition benefit. Installation of two set of sensors not only increase the cost without any significant benefit but also increase power requirement for example we need at least 30kVA . **Proposed content of new provision:** Wheel Profile Measurement locations: Data to generate 6 or more measurement per parameter should be collected from a minimum of 6 or more different locations around the circumference of the wheel covering at least 0.5 ~~one~~ meter of circumference length distributed over the entire 0.5-meter radial length with laser radial angle of 70°. **Novious:** Covering at least **800**mm of circumference length. **SWASTIK OVERSEAS /RIFTEK REMARKS:** Current system modification cover **0.7-0.75m** for diameter 770-1250mm system measure more than in 30 points with train speed 10kmph. **ApnaTech:** More than 1 measurement point should be adequate. mandating 6 measurements is likely to increase the overall cost. **Wabtec:** Wabtec's WPMS generates measurements from 6 profiles at 6 locations on the tread, but measurements from one selected (based on checks within the algorithm) profile is reported as the "final" measurements from the wheel. The 6 different locations cover approximately **650 mm** of circumference length. RDSO requested to revise this clause accordingly. **RT VISION Technologies Pvt. Ltd.:** Wheel Profile Measurement locations: Data to generate 6 or more measurement per parameter should be collected from a minimum of 6 or more different locations around the circumference of the wheel ~~covering at least one meter of circumference length.~~ **Premier India Agencies:**To be removed, Please note that this clause is suiting the design feature of one particular manufacturer. How does it matter to IR as to how many measurements are taken as long as accuracy parameters are achieved? Please delete this clause.	**CWM/PL WRLy:** System is not intended for finding defects such as flat faces on the wheel but merely attempts to provide a mean profile of the wheel around the limited circumference of the wheel. **NEXTSENSE:** System should be capable to measure at least 6 location. Individual Systems cannot be commented upon **Mermec/Vista:** Clause is revised. **Novious:** Clause is revised. **SWASTIK/RIFTEK:** Clause is revised. **ApnaTech:**Greater Accuracy and reliability of the reading is expected of the system **WABTEC:** Clause is revised. **RT Vision:** For enhancing coverage around circumferance distance is defined. **Premier India Agencies:** The comment is vague. This has been proposed to ensure that a wider sample of data of the wheels is available and to ensure that the accuracy of the parameters measured does not depend upon a single reading.

4.11	**Technology:** Latest available state of art technology of international standard like laser based and/or high speed camera or any other proven technology.	**Premier India Agencies:** Comply No comments	
4.12	**System Thresholds:** User Settable (Multiple Alerts- Maintenance Alert & Critical Alert) for all different measuring parameters of System with admin access only.	**NEXTSENSE:** Set in Calipri Predictor, not in measurement system - because these are type dependent. **Premier India Agencies:**Comply No comments	**NEXTSENSE:** System thresholds are necessary for predictive maintenance of the wheel. The system's software must be capable of generating user settable alerts. No comments can be offered for individual systems
4.13	**System Activation:** The system should be capable of automatic detection of approaching train along-with automatic switching-on/off of relevant systems.	**Premier India Agencies:** Comply No comments (DMA measurement system is equipped with a wake-up sensors)	

4.14	**Vehicle Identification:** The system should be capable of automatic identification of rolling stock in train along-with identification of type of rolling stock (Locomotives, Wagons, ICF or LHB Coach, BV, etc.) based on the integrated RFID reader and be capable of wheel identification within the rolling stock as per guideline No.: 2019/ CRIS/NDLS-ITPI/RFID/POLICY/0151/PT-1 ,Dated:22.08.2019 or latest issued by CRIS along with Annexure-3	**CWE/ECR/Hajipur:** Vehicle Identification: The system should be capable of automatic identification of rolling stock in train along-with identification of type of rolling stock (Locomotives, Wagons, ICF or LHB Coach, BV, etc.) based on the integrated RFID reader, inter axle distance etc. and be capable of wheel identification within the rolling stock as per guideline No.: 2019/ CRIS/NDLS ITPI/RFID/POLICY/0151/PT -1,Dated:22.08.2019 or latest issued by CRIS along with Annexure-3 **Remarks:** Vehicle identification through RFID is still under development and not been implemented. The rake may be hauled by different type of Locomotives/double locomotive etc. Hence, differentiation of first wheel of hauled coach/wagon from the locomotive unit should be done by the WPMS system. Also system should be capable to identify and distinguish wheels of DMC & DPC type of cars running in MEMU and DEMU rakes. **CWM/PL WRlys:** Vehicle Identification of rolling stock in a particular case where RFID tag is either not installed or damaged or missing. **SWASTIK OVERSEAS /RIFTEK REMARKS:** Please provide the guideline No.: 2019/ CRIS/NDLS-ITPI/RFID/POLICY/0151/PT-1 2 RFID tags per coach is enough to identify the direction and orientation of coach .It's required to install them under coach or locomotive .If it's required monitor by serial number of wheelsets It's necessary to install RFID tags per wheelsets. **Novious:** Provision of RFID Integration is acceptable, but depending only on RFID may lead to missing of trends as RFID is susceptible to damages. Thus having a backup mechanism is recommended **RT VISION Technologies Pvt. Ltd.:** A Camera with OCR and 24 hours working capability shall be additionally provided as interim measure. The camera shall be integrated with the data base. **Premier India Agencies:** Out of DMA scope, Is Vande Bharat is part of the rolling stock? Does all wagons, ICF, LHB, BV are fitted with RFID reader? What is the meaning of BV? Simply by RFID alone it is not possible to identify the type of rolling stock. For that camera vision system is required. Kindy confirm if it is possible to identify the rolling stock by the number printed on the rolling stock? If not a more elaborate system is required to identify the rolling stock.	**CWE/ECR/HJP:** The clause is revised. **CWM/PL WRly:** The clause is revised. **Swastik/Riftek:** Latest RFID guidelines are available in public domain, however it will be provided on demand. RFID tag are aleady installed on rolling stock. Supplier need to install RFID tag reader for idenification of rolling stock. **Novious:** The vehicle Idendification can also be done by manual input of data when an RFID tag is not read by RFID reader due to any reason like damage missing or equipment failure. Clause is revised. **RT Vision:** Not required as manual entry of rolling stock is allowed. **Premier India Agencies:** The vehicle Idendification can also be done by manual input of data when an RFID tag is not read by RFID reader due to any reason like damage missing or equipment failure. Kindly see the "Abbreviation" for BV mean. The information coded in RFID also includes the type of rolling stock.

4.15	**Calibration:** The system should be calibrated as recommended by the OEM but no later than every one year or earlier if requested by consignee. Details of calibration methodology shall be submitted along-with the offer. The supplier should arrange all equipment/accessories required for calibration of the system. All calibration activities should get logged in the data base or dash board and calibration report also generated.	**Wabtec**: It is requested that RDSO specifies the maximum number of additional calibrations per year that can be demanded by Consignee and the conditions under which these additional calibrations may be demanded may also be clarified. **Premier India Agencies:** Comply No comments	**Wabtec:** The calibration of the system will be required in case of any abnormality of the data recorded by the system . Therefore, Additional calibration frequency of the system cannot be defined at this stage.

4.16	**Integration:** Full TCP/IP (Transmission Control Protocol/Internet Protocol) support should be inbuilt into the system to facilitate smooth integration into all existing railway data networks. The system should be integrated with CMM, FMM and SLAM (CMM, FMM and SLAM are the modules developed by CRIS for monitoring of coaching, freight and locomotives respectively) and should also be able to integrate with multiple applications (existing and upcoming)-at the same time. For this purpose, successful bidder shall be required to send processed data in JSON format using restful API with token based authentication. The details of the API shall be provided by CRIS and JSON format will be decided based on the data generated by systems. System shall be capable of communicating over https protocol with external application and necessary communication protocols and details required for integration (including third party interfacing) of the system should be provided by the OEM to Indian Railways. System shall support multiple data formats such as JSON, XML, CSV, flat file etc. for information exchange. System shall be capable of handling security requirements of the communication. The transmitted data to CMM, FMM, and SLAM shall be the mean values of the parameters as given in Annexure-1 for each wheel as recorded in the pass by, the graphical plot of profile generated for each wheel and shall highlight alarms raised if any along with date and time stamps. These may be advised as per IR wheel numbering scheme (Annexure -3).	**NEXTSENSE**: Should be specified more precisley - what is written on the RFID tags and where are they positioned on the vehicle **Revised comment from Mermec:** Integration with existing application is OK but how it will be feasible with upcoming application. If it is limited to transfer of data in required JSON format than the requirement of integration shall be deleted. The communication security shall be defined specifically. The amended para is proposed. **Proposed content of new provision:** Integration: Full TCP/1P (Transmission Control Protocol/Internet Protocol) support should be inbuilt into the system to facilitate smooth integration into all existing railway data net~~works. The system should be integrated with CMM, FMM and SLAM (CMM, FMM and SLAM are the modules developed by CRIS for monitoring of coaching, freight and locomotives respectively) and should also be able to integrate with multiple applications (existing and upcoming) at the same time. For this~~ purpose,The successful bidder shall be required to send processed data in JSON format using restful API with token based authentication. The details of the API shall be provided by CRIS and JSON format will be decided based on the data generated by systems. System shall be capable of communicating over https protocol with external application and necessary communication protocols and details required for integration (including third party interfacing) of the system should be provided by the OEM to Indian Railways. System shall support multiple data formats such as BON, XML, CSV, flat file etc. for information exchange. ~~System shall be capable of handling security requirements of the communication.~~ Web Application for data visualization shall be cybersafe by design. It shall be accessible from any point of the Depot LAN with any device (laptop or smartphone). Two Factors Authentication (2FA) is available with LDAP login, using the same user credentials of the network domain. The transmitted data to CMM, FMM, and SLAM shall be the mean values of the parameters as given in Annexure-1 for each wheel as recorded in the pass by, the graphical plot of profile generated for each wheel and shall highlight alarms raised if any along with date and time stamps. These may be advised as per IR wheel numbering scheme (Annexure -3). **Wabtec:** RDSO is requested to provide detailed requirement for any "upcoming" applications prior to the tender so that any commercial implications/ costs can be factored into the offered price by the supplier. Or the requirement to integrate with any "upcoming" application may be removed. **Premier India Agencies:** ok	**NEXTSENSE:**The vehicle position details in the RFID tag are as per the guidelines mentioned in clause no. 4.14. **Wabtec:** will be provided. **Mermec/Vista:** clause is revised.

4.17	**Interface Control Documents (ICD):** The firm shall submit ICD to Indian Railways. This ICD will be used to integrate with 3rd party system or the interface between two systems or subsystems.	**COFMOW:** Interface Control Documents (ICD) (4.17): May specify the format and some of the standard details expected in the Interface Control Documents to ensure clarity and smooth integration with 3rd party systems. **NEXTSENSE:** Should be specified more precisely **Wabtec**: ICD can be provided. However, RDSO is requested to clarify that the integration with 3rd party system or the interface between two systems is not in the scope of this technical specification or the subsequent tender. **Premier India Agencies:** ok	**COFMOW:** Format detail is given in clause 4.16 **NEXTSENSE:** The clause is self explanatory. **Wabtec**: Integration of the system with third party systems is the responsibility of the supplier. Integration is not a system or a subsystem.
5	**Functional Requirements:**		
	The system should be run 24x7 (available round the clock) without any human intervention. Following information is required to be captured and displayed in reports for all type of rolling stock by wheel profile measurement system:	**Wabtec**: 24x7 is possible except during preventive maintenance, calibration and system breakdowns **Premier India Agencies:** Comply No comments	**Wabtec:** Noted
5.1	Date and Time of Passing Rake	**Premier India Agencies:** Comply . No comments	
5.2	Site/ Depot Name	**Premier India Agencies:** Comply .No comments	
5.3	Direction of passing Rake (IN/OUT)	**Premier India Agencies:** Comply .No comments	
5.4	Rake Speed	**Premier India Agencies:** Comply .No comments	
5.5	Total number of axles passed and total number of vehicles in the rake	**NEXTSENSE**: Only numbers of axles counted - no split into vehicles currently, are there separate RFID tags on each of the wagons? **Premier India Agencies:** ok. Software development	**NEXTSENSE:**Individual systems cannot be commented upon. There shall be separate RFID tags on each of the rolling stock.

5.6	Identification of rolling stock and wheel location and their position from engine	**COFMOW:** Identification of rolling stock should be delinked from capturing of data as detailed in para-1 above. **NEXTSENSE:** should be specified more precisly - what means "their position from engine"? **Premier India Agencies:** Partial comply Ref. to comments para No. 4.14 Is Vande Bharat is part of the rolling stock? Does all wagons, ICF, LHB, BV are fitted with RFID reader? What is the meaning of BV? Simply by RFID alone it is not possible to identify the type of rolling stock. For that camera vision system is required. Kindy confirm if it is possible to identify the rolling stock by the number printed on the rolling stock? If not a more elaborate system is required to identify the rolling stock.	**COFMOW:** It is essential to have every reading mapped to each of the rolling stocks. Delinking of Rolling Stock id to data captured shall not served any purpose. **NEXTSENSE:** It means the counting the rolling stock position from the first axle of the locomotive in moving direction considering Locomotive (s) as leading vehicle. In case the rake is measured in pushback mode as per extant practice for a consignee, the same shall be informed and adequate corrections made **Premier India Agencies:** The vehicle Idendification can also be done by manual input of data when an RFID tag is not read by RFID reader due to any reason like damage missing or equipment failure. Kindly see the "Abbreviation" for BV mean. **Clause revised.**
5.7	Parameters (Annexure-I) of each Wheel (Left & Right)	**Premier India Agencies:** Clarification required . Ref. to comments in para Annexure-I	**Premier India Agencies:** Kinldy ref to clause no.18
5.8	User defined Alarms based on measured parameters	**NEXTSENSE**: should be specified more precisely - are these generic thresholds for all wheels? **Premier India Agencies:** Comply . No comments	**NEXTSENSE:** Yes. Separate parameter tables have now been provided Annexure -1A & 1B **Clause revised.**
5.9	Type of rolling stock : Locomotives, Coaches (LHB, ICF), Train set/ Vande Bharat, DEMU, MEMU, Brake Vans	**COFMOW**: It should encompass the entirety of the rolling stock present in the Indian Railways. **Wabtec**: Identification of type of rolling stock, viz, Locomotives, Coaches (LHB, ICF), Train set/ Vande Bharat, DEMU, MEMU, Brake Vans will be done from RFID tags fitted by Indian Railways on their rolling stock. **Premier India Agencies:**Clarification required. are all these rolling stock fitted with RFID tags?	**COFMOW:** Noted, **Wabtec:** Yes and the vehicle Idendification can also be done by manual input of data when an RFID tag is not read by RFID reader due to reason like damage missing or equipment failure. **Premier India Agencies:** Prolification of RFID tag is under process by IR. The vehicle Idendification can also be done by manual input of data when an RFID tag is not available. **Clause revised.**
6	**Software Requirements:**		

6.1	The supplier shall have to provide documents explaining the methodology and logic used to develop the algorithm for the system to get the required output. Any information/ explanation deemed proprietary may be indicated in the technical bid for comparison with other offers. Unless indicated, it shall be presumed that the tenderer has no limitation in sharing any information on logic/ methodology used.	**Wabtec**: The methodology and logic used to develop algorithm are proprietary and cannot be shared. **Premier India Agencies:** Comply. No comments	**Wabtec:** Firm may seek an NDA (Non-Disclosure Agreement) with RDSO/ IR. The sharing of Logic is essential to establish how the various clauses of the specification are satisfied.
6.2	The supplier shall be responsible for providing required software for collecting data, storage, graphical and tabular presentation of reports sent by the system. The Database Management and archiving shall also be carried out by the supplier at regular intervals.	**Premier India Agencies:** Ok . Data Management System provided by Sub-supplier.	**Premier India Agencies:** The complete system (including bought out subsytems) shall be the responsibility of supplier.
6.3	The system should be able to record and measure all the parameters of each passing wheel as mentioned in **Annexure-1**	**Premier India Agencies:** Refer to comments Part B - para No. 18	**Premier India Agencies:** Remark is given against para no. 18.
6.4	The System server must have the capability to store a history of all type of data for at least the last 24 months for each vehicle wheel.	**COFMOW**: Data Archiving Interval (6.4): Clarification is needed regarding the data archiving interval for the system server. May specify whether the data should be archived on a daily, weekly, or monthly basis to ensure clear implementation of the 24-month data storage requirement. **Wabtec**: Historical data is possible for all RFID fitted vehicles only. **Premier India Agencies:** ok. Storage memory to evaluate	**COFMOW:** The system server will continuously store the data for at least the last 24 months. No archiving requirement is legislated as the requirement based on file size may be different for each prospective supplier **Wabtec:** Both RFID and manually entered vehicle data must be stored for at least the last 24 months. **Premier India Agencies:** All data recorded by the system shall be stored for at least the last 24 months.

6.5	The system should be capable to integrate with CMM, FMM and SLAM for all reports generated from the system. Also user feedback from CMM, FMM and SLAM should be reflected in system software.	**NEXTSENSE**: should be specified more precisely - which user feedback shall be presented where? **ApnaTech:** Interface document for the data sent from CMM FMM SLAM to be shared **Wabtec**: RDSO is requested to provide detailed requirement prior to the tender so that any commercial implications/ costs can be factored into the offered price by the supplier. **Premier India Agencies:** Partial comply. The Wheel monitoring system is provided of an Ethernet port for the communication between the measurement system and the Client's management softwares	**NEXTSENSE:** Consignee provide the feedback reports in the IR systems that should get displayed on the website. **ApnaTech:** Yes, the interface document shall be shared by the consignee and supplier of the system **Wabtec:** The requirement spelt out is sufficiently detailed. It is not clear what additional clarification is required **Premier India Agencies:** WPMS webserver should be caplable to integrate with all Modules. Individual systems cannot be commented upon
6.6	The system should be equipped with robust, networked, alert-management software with full suite of graphical analysis and diagnostic tools.	**COFMOW**: Alert Management Software (6.6): May specify the types of alerts, severity levels, and corresponding actions required for the robust, networked alert-management software (6.6) to ensure a clear understanding of its functionality. **Premier India Agencies:** Comply .No comments	**COFMOW:** It is mentaioned in cluase no.9.8 with Annexure-1 &2
6.7	The system server must have software for trending of the data history of the Wheels and be capable of presenting graphically the progression of profile based on data, duration and interval/step selected for any wheel.	**COFMOW**: Trending and Graphical Presentation (6.7): May clarify the specific types of graphs and trending features expected for the graphical presentation of data history and profile progression, as mentioned in the specification. This ensures a shared understanding of the required graphical analysis tools. **Wabtec:** Trending is possible for all RFID fitted vehicles only. **Premier India Agencies:** Partial comply. Require a software platform like TracksNet.	**COFMOW:** Trending and graphical presentation for each parameter should be represented by the system as per Clause No. 18 **Wabtec:** If the RFID is damaged or missing, vehicle details will be entered manually. And by this trending should be possible for all rolling stock. **Premier India Agencies:** The software should be supply by the supplier
7	**Web-server:**		
	The supplier shall launch and maintain an internet web-server at any location (in India) with following features:	**Wabtec:** Please clarify if MeitY empanneled cloud service providers can be used for cloud hosting. **Premier India Agencies:** Clarification required. Please confirm if only one web server is required for multiple systems?	**Wabtec:** The cloud service shall be used as per norms & regulations of Ministry of Electronics and Information Technology, Govt of India. **Premier India Agencies:** Yes at least one web-server will be required. The detailed System architecture is left to the industry participant
7.1	Multiple User password protected log-in	**Premier India Agencies:** Comply. No comments	

7.2	Differential access and usage rights to multiple levels of users e.g. write-only, read-only, query design and administrator rights.		
7.3	Facility to export data in MS-Excel, CSV (Comma Separated Value) format at present but other formats may be accepted later by consignee if found suitable and on demand software based transfer of data to other railway applications. All the data transfer must be over secured network with authenticated and shall be properly logged for audit and tracking. Firms shall also provide ICD (Interface control document) for system database.	**COFMOW:** Data Export Formats (7.3): The specification mentions the facility to export data in MS-Excel, CSV, and PDF formats. May specify the version of these Excel, CSV and PDF formats being latest and their licenses to be available with the vendor. Other Acceptable Formats (7.3): It's mentioned that other formats may be accepted later by the consignee if found suitable. It would be helpful to mention that they should be available in addition to Excel, CSV and PDF formats. Scalability (Not Explicitly Stated): May specify whether the web server system is designed to handle scalability requirements, like an increase in users or data volume over time, as scalability is not explicitly addressed in the current specifications. **Wabtec:** The IR requirement should be clearly stated at the time of the tender, so that any commercial implications/ costs can be factored into the offered price by the supplier. The section "but other formats may be accepted later by consignee if found suitable and on demand software based transfer of data to other railway applications" may be deleted. **Premier India Agencies:** Comply. No comments	**COFMOW:** The clause is revised. **Wabtec:** If there is any requirement which is not specified in the specifications it will be clearly mentioned to the tenderer at the time of tender. **The clause is Revised.**
8	**Safety Requirements:**		
8.1	The system shall be protected from external EMI/EMC/RFI interferences, electrified OHE (Over Head Equipment).	**Mermec/Vista**: Requirement is vague (how to demonstrate this?). We would suggest adding compliance to EN 50121-4 and EN 50122 and the supplier to demonstrate this by design documentation and certificates. **Proposed content of new provision:** The system shall ~~be protected~~ comply to EN 50121-4 and EN 50122 ~~from~~ for protection against external EMI/EMC/RFI interferences, electrified OHE (Over Head Equipment). (Repeated comment on 26.02.2024) **Premier India Agencies:** Comply. No comments	**Mermec/Vista:** The clause is Revised.
8.2	The system shall be so designed that it shall not hamper signalling, track, communication, electrical systems, etc. in service in IR.	**Premier India Agencies:** Comply. No comments	

8.3	The functioning of the system shall not get affected by the usual environmental and site conditions like vibrations from passing trains, track maintenance vehicles/ equipment not involved in pre-advised and scheduled maintenance activity at the site, heavy rain and water, animal trespassing and heat/ sunlight.	**NEXTSENSE**: Operator should take precautions to avoid animal trepassing **Mermec/Vista:** Requirement is vague (how to demonstrate this?). We would suggest adding compliance to EN 50125-3 and the supplier to demonstrate this by design documentation and certificates. **Proposed content of new Provision:** The system shall be designed as per the compliance to EN 50125-3 so that the functioning of the system shall not get affected by the usual environmental and site conditions like vibrations from passing trains, track maintenance vehicles/ equipment not involved in pre-advised and scheduled maintenance activity at the site, heavy rain and water, animal trespassing and heat/ sunlight. **Revised comment from Mermec:** Requirement is vague (how to demonstrate this?). We would suggest adding compliance to EN 50125-3 and the supplier to demonstrate this by design documentation and certificates. **Proposed content of new Provision:** The functioning of the system shall not get affected by the usual environmental and site conditions like vibrations from passing trains, track maintenance vehicles/ equipment not involved in pre-advised and scheduled maintenance activity at the site, heavy rain and water, animal trespassing and heat/ sunlight. Thus, the design of the system shall be compliant to BS EN 50125-3 with provision of following : 1.self-cleaning devices, 2.Time Before Failure (MTBF) of the WPMS up to 18 thousand hours. 3.The target availability to generate data for each transit >= 98%. **Wabtec:** Wabtec recommends that the scanner boxes be removed prior to any track maintenance activity to avoid any mishap/ damage to the system. Moreover, while heavy rain is acceptable, any water logging or flooding will damage the track mounted sensors. Moreover, WPMS cannot be designed to withstand animal trespassing such as a herd of cattle/ elephants. **Premier India Agencies:** Comply As for all optical instruments, heavy rain, dust, and direct sunlight have the potential to adversely affect measurement quality. Given this, the better solution to avoid this problems is to install the wheel measurement system inside one of the depot's buildings.	**NEXTSENSE/Wabtec:**The supplier should ensure that the system is not affected during animal encroachment. **MERMEC:** Please refer clause no.10 **Premier India Agencies:** It is not possible to install the system inside the depot's building. **The clause is Revised.**
8.4	The system shall be designed on fail-safe principles and adequate safety margins must be incorporated in the design for systematic and random failures.	**Premier India Agencies:** Comply The measurement system will be designed on a fail-safe basis, althrough no redundacies are included. This ensures that in event of a fault, the system poses no risk to personnel or infrastructure. However, it may be unable to substain measurement activities or, in the case of a minor fault, operate in degraded mode.	**Premier India Agencies:** Noted.

8.5	The system should be adequately protected from waste discharge from the coaches and other ambient conditions including moisture and dirt.	**SWASTIK OVERSEAS /RIFTEK REMARKS**: Please provide details What kind of waste discharge? May be after waste discharging it will be required to clean system. **Wabtec**:Waste should not be discharged on top of the WPMS system. Extensive cleaning may be required of the system and optical surfaces in case of waste discharge on top of the WPMS system. **Premier India Agencies:**Comply. No comments (DMA Wheel measurement system is designed for outdoor installation and for railways application.)	**Swastik/Riftek:** Water,oil,greases and dry refuse etc.and also required to clean **Wabtec:** The system must be designed for safety in case discharge of waste into the system
8.6	System shall be designed and installed in such a way that it should be well protected during accident free train operation and routine maintenance and should have reasonable anti pilferage mechanism as per good industry practices.	**SWASTIK OVERSEAS /RIFTEK REMARK:** Its required to clarify what type of protection is required. **Premier India Agencies:** Clarification required. Please inform what are the good industry practises?	**Swastik/Riftek, Premier:** During normal operation it will be protected and there should be anti theft device installed on the system
8.7	System should be able to protect train drivers, passengers and train side personnel from dazzling lights. To ensure human eye and skin safety, the system shall not exceed the Maximum Permissible Exposure (MPE) from a Nominal Ocular Hazard distance (NOHD) of 1 m from the track as per EN 60825-1:2014 +A 11:2021. Necessary certificate may be provided from OEM in original.	**NEXTSENSE**: for accurate and reliable measurement results we recommend laser class 3B and the safe distance for personnel of 2m **Novious**: For precise measurements laser class 3B with safe distance of 2 mtr is recommended. Further protection can be achieved by Flap mechanism can be used **Premier India Agencies:** Comply. No comments (DMA laser is designed according to EN 60825-1 "Safety of laser product - Part 1: Equipment classification and requirements")	**NEXTSENSE, Novious:** Clause is revised.
8.8	The system functionality shall not be affected by lightning and surge. Suitable lighting arrestors/ Earthing of the system may be planned for suppression of power line surges, spikes, transients to protect electronic circuits and equipment.	**SWASTIK OVERSEAS /RIFTEK REMARK:**Control cabinet has lightning protection module. **Wabtec**: The WPMS system will get damaged in case of a direct lightning hit. **Premier India Agencies:** Comply. No comments (DMA equipment is in compliance with EN62305-3 "Protection against lightning - Part 3: Physical damage to strucutres and life hazard" standard)	**Swastik/Riftek, Wabtec**: The supplier must ensure that the system will be protected from direct lightning strikes. **WABTEC:** Lightning protection may be planned
9	**Output Requirements:**		
9.1	**Data Communication:**		

9.1.1	All the data being generated by the system equipment, website, servers etc. with respect to Indian Railway operations shall be the exclusive property of Indian Railway and firm shall not use it for any other purpose.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** We need to request the access to the system for system status monitoring and for calibration. **Premier India Agencies:** Out of DMA scope. No comments	**Swastik/Riftek:** Access will be available for monitoring and calibration purpose. **Premier India Agencies:** Individual systems and agreed scopes between principals and their Indian partners cannot be commented upon
9.1.2	The data shall be made available in a format as finally decided by Indian Railways in consultation with the supplier in suitable database. At the end of the contract, or as and when required by Indian Railways, firm shall hand over the complete data set to IR and must destroy any left-over data. Indian Railway shall be free to put data for any alternative use during the contract as well as after the contract period. Any alternate use of such data by the firm shall only be done with the expressed permission of IR.	**Wabtec:**The IR requirement should be clearly stated at the time of the tender, so that any commercial implications/ costs can be factored into the offered price by the supplier. **Premier India Agencies:** Clarification required. We would like to know beforehand the format of reports so that we know the extent of software modification.	**Wabtec, Premier India Agencies:** The format of the data report will be decided in consultation with the consignee and supplier at any stage as per requirement. The reports shall be as per para 7.3
9.1.3	The report of the data captured by the system shall be relayed by the device via suitable communications media to a secure web server on the internet within 10 minutes after the passage of the last axle.	**Wabtec:** Reports / alerts will take ~15 minutes after the passage of the last axle for a train upto 100 axles to be relayed to end user. If another train arrives at the system location before the data is processed and alerts/ reports transmitted, the alerts/ reports will get delayed by the time duration that it takes for this new train to pass through the WPMS system. Please read this comment in conjunction with Wabtec's comment against Clause 4.3 and Clause 9.7. RDSO is requested to revise this Clause accordingly. **Premier India Agencies:** Comply. Provided internet connection available (responsibility of Third party, Internet operator)	**Wabtec:** The clause is revised. **Premier India Agencies:** Refer to Para 3.7, 3.8 & 3.9.
9.1.4	The equipment shall have the capability to record and locally store raw captured data and processed reports for upto at least last 10 days.	**Wabtec:** Processed reports are not stored locally but in the central database**.** **Premier India Agencies:** Partial comply. Storage memory to evaluate	**Wabtec:** It is required to store the data locally at depot level. **Premier India Agencies:** Requirment of individual system can not be commented.

9.1.5	The backend server systems shall be maintained and operated by the supplier. These servers shall be capable of storing data and shall be able to display average readings of every parameter of each wheel in reports for every pass-by and its graphical representation for up to last 24 months. The individual (Min 6 locations around the circumference of the wheel) readings of each parameter constituting the average may also be retained and be available to holders of admin logins.	**NEXTSENS:** We gaurantee 2 measurments per wheel at an angle of 85-90 degree; linear distance between two measurments is a function of wheel diameter. **Wabtec:** Wabtec's WPMS generates measurements from 6 profiles at 6 locations on the tread, but measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the "final" measurements from the wheel, which is not the average of the 6 profiles. **Premier India Agencies:** Partial comply. DMA: This clause is specific to the design of a particular manufacturer. Please remove it.	**Nextsense:** This is already discussed in Para 4.10. **WABTEC:** Individual Systems cannot be commented upon as no details of how the best image is arrived at is not explained in the argument **Premier India Agencies:**The specification is attempted to be vendor agnostic. Specific beneficiaries have not been reported for attention / redressal
9.1.6	The access to the report shall be provided by a standard web browser that works on various devices such as desktops/laptops/notebooks and smart phones. Users of the systems shall be provided logins / passwords for accessing the data	**Premier India Agencies:** Out of DMA scope Refer to para-6.2 Data Management System provided by Sub-supplier.	**Premier India Agencies:** No comments can be offered for individual systems or the nature of association between OEMs and their India Agencies
9.1.7	The data shall not be divulged by the supplier to anyone other than consignee and to those authorized by consignee.	**Premier India Agencies:** Comply. No comments	

9.2	**Alarms report through App:** The firm should develop a mobile application for the user to get various alerts along with relevant positions through push notifications. The application should be designed for Android and IOS both.	**COFMOW:** Mobile Application Development (9.2): May clarify the features and functionalities of the mobile application intended for alerts to improve understanding and ensure comprehensive comprehension. Additionally, it is imperative to incorporate a feature that allows the segregation of alerts based on user-defined criticality levels. Upon installation of the app, notifications must remain enabled. This same feature should also be incorporated into the desktop version for consistent functionality. This enhancement will provide a more tailored and effective alert management system, ensuring that critical issues are promptly communicated to the relevant personnel. It will be independent of the hardware and will be a part of software as detailed at Para-1 above. **NEXTSENSE:** Several android/iOS versions need to be considered creating lot of effort during operation.Email service is free of additional efforts **SWASTIK OVERSEAS /RIFTEK REMARKS:** Alarms can be developed as messages in messagers (whattsapp, telegram) **Premier India Agencies:** Out of DMA scope. please let us know what kind of mobile application is required?	**COFMOW, NEXTSENSE, SWASTIK/RIFTEK, Premier India Agencies:**This section has been removed as alert reports are received through SMS which is efficient as maintenance of the app is burdened with additional costs.Therefore , it is deleted.
9.3	**Diagnostic reports:** The system shall be capable of running self-diagnosis programs and report the result through the website and by SMS. It should log all system errors such as main power failure, network failure or poor network speed and events like rake passing & system reboot etc.	**Wabtec:** Please clarify why 'events like rake passing' is considered as 'system error'. Network speed/ failure information will be limited to the extent available from third party ISPs/ mobile service providers. **Premier India Agencies:** Partially comply. DMA equipment is provided of a diagnostic system and can generate reports. SMS transmission is to be developed.	**Wabtec:** the clause is revised **Premier India Agencies:** No comments can be offered for individual systems or the nature of association between OEMs and their India Agencies The Clause is revised as 9.2 in final draft
9.4	**Feedback:** System database should have provision of recording and analyzing the feedback of action taken by the depot staff on alerts generated by the system, including provision of entry of false negatives cases. For this purpose, standard feedback messages may be provided in a dropdown menu besides a category for ‘Other’ defects feedback allowing detailed write-up of upto 50 Characters.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** We can add text option to measurements in data portal. **Premier India Agencies:** ok	**SWASTIK OVERSEAS /RIFTEK REMARKS:** Extra provision of individual system can not be commented on this stage. (Note:Now this is clause no. 9.3 of final draft)

9.5	**Highlight Thresholds Limits:** In the reports, the system shall be able to highlight the wheel parameters that exceed different thresholds limits (as specified in Annexure-1) in up to three (3) different colours.	**Premier India Agencies:** ok	(Note:Now this is clause no. 9.4 of final draft)
9.6	**Identification & Position:** The system should be able to identify and count no of engines, coaches or brake vans, and also should be able to relate each axle with engine or coach/ wagon or brake van and its position from the locomotive in the marshalling order.	**NEXTSENSE:** Should be specified more precisly **SWASTIK OVERSEAS /RIFTEK REMARKS:** Should we control serial number of wheelsets. **Wabtec:** This is possible but for best results, IR should install RFID tags on its rolling stock. **Premier India Agencies:** Clarification required. Necessary a Video inspection system due to the WPMS system is not able to identify this information because it has not been designed fot it.	**NEXTSENSE:**Kindly ref clause no.4.14 **Swastik/Riftek:** No,the serial number of wheelsets may not be possile to record. **Wabtec:** Noted. **Premier India Agencies:** The vehicle Idendification can also be supplemented by manual input of data when an RFID is not read due to any reason like damage missing or equipment failure. The Clause is revised as 9.5 in final draft
9.7	**Alarms through SMS:** Reports for alarms based on parameters exceeding the prescribed limits shall be sent to up to four users for every site through SMS. Alarms report should be communicated through SMS within 10 minutes after passage of the rake. If the SMS is not received within 10 minutes of the last passing wheel of the rake, it will be considered delayed. The Alarms messages shall convey the following minimum information:	**NEXTSENSE:** Needs to be checked, how this can be established **Wabtec:** Reports / alerts will take ~15 minutes after the passage of the last axle for a train upto 100 axles to be relayed to end user. If another train arrives at the system location before the data is processed and alerts/ reports transmitted, the alerts/ reports will get delayed by the time duration that it takes for this new train to pass through the WPMS system. Please read this comment in conjunction with Wabtec's comment against Clause 4.3 and Clause 9.1.3. RDSO is requested to revise this Clause accordingly. Also, please clarify whether Alarms are to be transmitted through SMS or through App, as stated in Clause 9.2. **RT VISION Technologies Pvt. Ltd.:** Alarms through SMS/Notification **Premier India Agencies:** Clarification required . Refer to para No. 6.2 Data Management System provided by Sub-supplier.	**NEXTSENSE:**The system software is able to communicate the same**.** **Wabtec:**Agreed for change to 15 min. Clause modified. Alarm needs to be generated as SMS **RT Vision:** Noted **Premier India Agencies:** The complete system should be supply by the supplier. The Clause is revised as 9.6

9.7.1	RFID vehicle identification (if available/ provided on the Rolling Stock or reconstructed based on marshalling data)	**Wabtec:** Please clarify the type of interface that Indian Railways will provide for the marshalling data. RDSO is requested to provide detailed requirement prior to the tender so that any commercial implications/ costs can be factored into the offered price by the supplier. **Premier India Agencies:** Clarification required. Refer to comment No. 4.14 Is Vande Bharat is part of the rolling stock? Does all wagons, ICF, LHB, BV are fitted with RFID reader? What is the meaning of BV? Simply by RFID alone it is not possible to identify the type of rolling stock. For that camera vision system is required. Kindy confirm if it is possible to identify the rolling stock by the number printed on the rolling stock? If not a more elaborate system is required to identify the rolling stock.	**Wabtec:** Marshalling data will be manually fed into the system. therefore no requirement of interface for this purpose. **Premier India Agencies:** Pls read para 5.9 and abbreviations for VB and BV The fitting of RFIDs in all stock is at an advanced stage of completion Individual systems and their limitations cannot be commented upon. Camera based coach identification has been known to suffer from difficulties related to non standard fonts and possible fading/ erasure/ obscurement of rolling stock ids The Clause is revised as 9.6.1
9.7.2	Location of identified wheel as per IR numbering scheme for wheels	**Premier India Agencies:** Comply. No comments	(Note:Now this is clause no. 9.6.2 of final draft)
9.7.3	Rolling Stock type Passenger (ICF,LHB,VB), Freight or Locomotive	**Wabtec:** For best results, IR should install RFID tags on its rolling stock. **Premier India Agencies:** Clarification required Refer to comment No. 4.14 Is Vande Bharat is part of the rolling stock? Does all wagons, ICF, LHB, BV are fitted with RFID reader? What is the meaning of BV? Simply by RFID alone it is not possible to identify the type of rolling stock. For that camera vision system is required. Kindy confirm if it is possible to identify the rolling stock by the number printed on the rolling stock? If not a more elaborate system is required to identify the rolling stock.	**Wabtec :** Noted **Premier India Agencies:** Pls see remarks at para 9.7.1 (Note:Now this is clause no. 9.6.3 of final draft)
9.7.4	Date and time	**Premier India Agencies:** Comply. No comments	(Note:Now this is clause no. 9.6.4 of final draft)
9.7.5	Direction of movement	**Premier India Agencies:** Comply. No comments	(Note:Now this is clause no. 9.6.5 of final draft)
9.7.6	Vehicle position from the first locomotive	**Premier India Agencies:** Clarification required Refer to comment No. 4.14 Is Vande Bharat is part of the rolling stock? Does all wagons, ICF, LHB, BV are fitted with RFID reader? What is the meaning of BV? Simply by RFID alone it is not possible to identify the type of rolling stock. For that camera vision system is required. Kindy confirm if it is possible to identify the rolling stock by the number printed on the rolling stock? If not a more elaborate system is required to identify the rolling stock.	**Premier India Agencies:** Pls see remarks at para 9.7.1 (Note:Now this is clause no. 9.6.6 of final draft)
9.7.7	Axle number where the parameters are found out of range.	**Premier India Agencies:** Clarification required	(Note:Now this is clause no. 9.6.7 of final draft)

9.7.8	System Error Message: In case of error in recording or any system failure, Messages shall be generated and transmitted similarly to nominated users.	**Premier India Agencies:**Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies:** Query unclear. The complete system must be supplied by the supplier. (Note:Now this is clause no. 9.6.8 of final draft)
9.8	**Basis of alarms:** It should be possible to raise at least one additional user settable (Attention) graded maintenance alarm for each parameter, when the measurement exceeds the user prescribed limit of the parameters. The wheel parameters and their attention/ withdrawal limits are prescribed in Annexure -1	**Wabtec:** Please clarify what is meant by 'at least one additional user settable (Attention) graded maintenance alarm. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Wabtec:** Two alarms shall be for drawing attention and withdrawal respectively as indicated in Annexure 1 &2 for Locomotive, passenger, freight and VB Stock. **Premier India Agencies:** No clarification has been sought. The Clause is revised as 9.7
9.9	**Data Querying:** The generated data shall be downloadable by user in MS Excel sheet for any time duration from date of commissioning of equipment, using a user-settable data filter in the dash board. User should be able to apply any or all of the following filters on database simultaneously or otherwise as per requirement of rolling stock for further analysis in the database:	**Wabtec:** Reports are available in PDF and query results are available to be downloaded in CSV. RDSO is requested to revise the requirement accordingly. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Wabtec:** Individual Systems and formats cannot be commented upon. MS Excel provides easy manipulation of data for likely analysis. **Premier India Agencies:** No clarification has been soughtt. It appears that the firm has merely forwarded the comments from their principals and this comment is for the Indian partner/ integrator to answer on behalf of the Suppliers. (Note:Now this is clause no. 9.8 of final draft)
9.9.1	From …date to …date	**Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies:** No clarification has been sought. Refer to Clause 7. (Note:Now this is clause no. 9.8.1 of final draft)
9.9.2	LHB /ICF coach wise	**Wabtec:** LHB and ICF coach identification is best done through RFID tags installed on the coaches by Indian Railways. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Wabtec:** Noted **Premier India Agencies:** No clarification has been sought. The Clause is revised as 9.8.2
9.9.3	Direction wise (In/Out)-user selectable	**Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies:** No clarification has been sought. (Note:Now this is clause no. 9.8.3 of final draft)

9.9.4	Summary of alerts –month wise, year wise-user	**COFMOW**: It should be user configurable, i.e. if user requires a specific format and timeline, the firm's technical representative should modify the summary accordingly. **Wabtec**: Please specify the storage duration for historical data. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier."	**COFMOW:** It is mentioned in clause no.9.8 **Wabtec:** It is mentioned in clause no.6.4 (Note:Now this is clause no. 9.8.4 of final draft) **Premier India Agencies:** No clarification has been sought.
9.9.5	"System Site wise alert analysis-more than one sites at a time user selectable"	**Premier India Agencies**: Clarification required Data Management System provided by Sub-supplier."	**Premier India Agencies**: No clarification has been sought. (Note:Now this is clause no. 9.8.5 of final draft)
9.9.6	Parameter wise-user selectable range	**Premier India Agencies**: Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies**: No clarification has been sought. (Note:Now this is clause no. 9.8.6 of final draft)
9.10	**Report Generation:** The supplier shall launch, operate and maintain an internet-based website during warranty and comprehensive maintenance period for making available the reports to users authorized by consignee. The website shall have the following features: -	**Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies:** No clarification has been sought. (Note:Now this is clause no. 9.9 of final draft)
9.10.1	Password based access so that only authorized personnel by consignee can enter/edit/view/download data and reports.	**Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier. (Note:Now this is clause no. 9.9.1 of final draft)
9.10.2	Differential privileges to different levels of users to access the resources of the website. Minimum 3 access/ privilege levels may have to be designed.	**NEXTSENSE:** An automated system does not require many levels of user interaction. 2 levels shall be sufficient (detailed roles/responsibilities with respect to data access rights) **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**NEXTSENSE:** Minimum 03 access/privilege levels are required. Admin level Division Control Depot/ Rake Incharge Level **Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier.

9.10.3	The supplier shall supply one laptop per system supplied at a place nominated by consignee of the configuration as specified by tenderer along with relevant software. The consignee may, at its discretion request connectivity and software installation at upto three additional machines in the depot or control offices.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** The supplier shall supply one laptop/tablet per system supplied at a place nominated by consignee of the configuration as specified by tenderer along with relevant software. The consignee may, at its discretion request connectivity and software installation at upto three additional machines in the depot or control offices. **Wabtec:** Please clarify whether the "three additional machines in the depot or control offices" will be provided by the Consignee or the WPMS supplier. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Swastik/Riftek:** Noted **Wabtec:** Supplier needs to provide one laptop with each WPMS system. If consignee wants to install software in additional three computer, these system in the depot or control offices will be provided by the Consignee **Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier. **The Clause is revised as 9.9.3**
9.10.4	The system output shall consist of data reports. Data acquired by the system shall be sent to a web server and the reports shall be available to the users on demand.	**Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier. (Note:Now this is clause no. 9.9.4 of final draft)
9.10.5	**Raw Data Report:** This report will provide all parameters of each wheel with each location of measurement as per format in Annexure 2. This shall be available to Admin login only.	**NEXTSENSE:** We (do) not export single parameters for each of these two readings (only average values) **Wabtec:** Wabtec's WPMS generates measurements from 6 profiles at 6 locations on the tread. Measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the "final" measurements from the wheel. The six profiles can be reported if required. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**NEXTSENSE:**Individual systems cannot be commented upon. The raw data of every parameters on each location is required for further analysis and evaluation. **Wabtec:** Individual Systems cannot be commented upon as no details of how the best image is arrived at is not explained in the argument **Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier. (Note:Now this is clause no. 9.9.5 of final draft)
9.10.6	**Detailed Report:** This report shall provide a table giving values of all parameters in Part C as acquired around the wheel circumference and averaged by the system. These may be used to develop the profile plot for each wheel. The profile plot of each wheel may be plotted graphically and presented against suitable grid background.	**NEXTSENSE:** Only average numbers are shown **Wabtec:** Wabtec's WPMS generates measurements from 6 profiles at 6 locations on the tread. Measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the "final" measurements from the wheel. The profile plot is based on "final" measurements and not the "average. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier**.**	**NEXTSENSE:** Noted **Wabtec**: Refer to reply of para 9.10.5 **Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier. (Note:Now this is clause no. 9.9.6 of final draft)

9.10.7	**Exception report:** This report shall be an abridged version of the detailed report showing only the list of wheels where the parameters have exceeded the prescribed attention (if specified) and withdrawal limits. It should be possible to directly obtain up to 5 prior measurements reported for the same wheel/axle/rolling stock by digging down (hyperlinked) through the electronic report of exceptional wheels.	**Wabtec**: 5 prior measurements are available through the trending feature of the graphical user interface. RFID tagging is a must for any trending. The requirement of reports being "hyperlinked" is not clear and RDSO may please clarify the utility of same. **Premier India Agencies:** Clarification required Data Management System provided by Sub-supplier.	**Wabtec:**The five prior measurements are required not through the trending feature. What is asked for is that the exception report should enable user to look for the 5 prior readings of the same wheel directly from the hyperlink in the exception report. Similar querying possible elsewhere in the system is irrelevant to the clause. Individual system presentations of data cannot be commented upon. **Premier India Agencies:** No clarification has been sought. The complete system must be supplied by the supplier. (Note:Now this is clause no. 9.9.7 of final draft)
9.10.8	System should be able to generate customized report as per requirement of Indian Railways/RDSO based on flexible queries.	**Wabtec**: RDSO is requested to provide detailed requirement prior to the tender so that any commercial implications/ costs can be factored into the offered price by the supplier. **Premier India Agencies:** Clarification required We would like to know beforehand the format of reports so that we know the extent of software modification.	**Wabtec, Premier India Agencies:** Querying requirements shall be as per para 9.8 and 9.9 (Note:Now this is clause no. 9.9.8 of final draft)
10	**Standards and norms applicable:**		
	System should ~~be~~ follow latest applicable National/ International standards to meet technical and functional requirements and shall submit data sheet indicating compliance of each sub system equipment at the bidding stage. Some of indicative relevant standards as applicable for the reference of bidder are as under:	**SWASTIK OVERSEAS /RIFTEK REMARKS:** We need an example of such datasheet .How can we indicate compliance? **ApnaTech:** EN 50125-2- Railway applications - Environmental conditions for equipment Part 2 is more in line with this equipment. This equipment is not for signaling or telecommunications. **Wabtec:** Not all of the indicated Standards are applicable for WPMS. **Premier India Agencies:** Comply No comments (DMA equipment is designed and tests according to European and International standrads, norms and directives)	**Swastik/Riftek:** The data sheet should contain details of the sub systems/components/sensors etc. Examples being components such as Sensor, Triggering mechanism, Camera, Cooling System, IP System certificates and compliance and protestion systems related to Eye safe Lasers etc. and their compliance with relevant standards **Apna Tech:** EN 50125-3 deals with environmental conditions for signalling and telecommunication equipments that are usually kept trackside (like Point machines and gears) and have environmentally exposed cubicle/ housing akin to what may be required for this system. As such applicability of EN 50125-3 is requsted. **Wabtec:** Comment is vague. Specific departures have not been indicated. **Premier India Agencies:**Individual systems cannot be commented upon
	Sr. **Standards and norms applicable:**	**Premier India Agencies:** Partial comply	

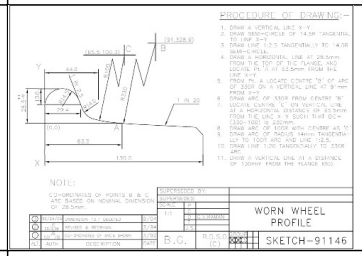
	1	EN 15313:2016	Railway applications - In-service wheelset operation requirements - In-service and off-vehicle wheelset maintenance	**Premier India Agencies:** EN 15313: NOT applicable because is referred to Operators (this standard defines the limit of the wheel's operability)	**Premier India Agencies:** Provided as informative reference for tread design and defect locations identification. No compliance certificate is desired
	2	EMVA 1288	Standard for Characterization of Image Sensors and Cameras	**Premier India Agencies:** EMVA 1288: NOT applicable because referred to Image sensors manufacturers	**Premier India Agencies:** Firms are few to deploy both area as well as Line scans which are both covered by EMVA 1288.
	3	EN 60825 1:2014 +A 11:2021	Safety of laser products - Part 1: Equipment classification and requirements	**Premier India Agencies:** EN 60825: no comments	
	4	EN 50125-3	Railway applications - Environmental conditions for equipment Part 3: Equipment for signalling and telecommunications	**Premier India Agencies:** EN 50125: no comments	
	5	EN 50121-4:2015	Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signaling and telecommunications apparatus.	**Premier India Agencies:** EN 50121: no comments	
	6	EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards - Emission standard for industrial environments	**Premier India Agencies:** EN IEC 61000: no comments	
	7	2014/35/EU	Low Voltage Directive - Electrical equipment designed for use within certain voltage limits	**Premier India Agencies:** 2014/35/EU: no comments	

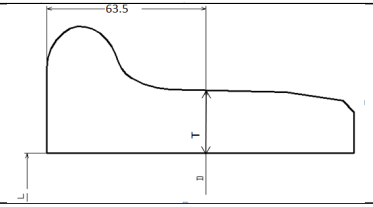
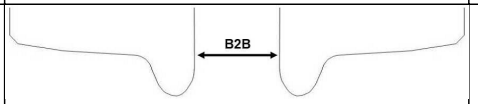
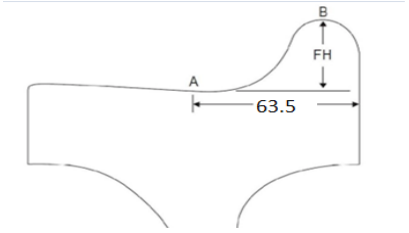
	8	ISO 14837-1	General guidance on mechanical vibration for ground-borne noise and vibration arising from rail system	**Premier India Agencies:** ISO 14837-1: NOT applicable at WPMS system	**Premier India Agencies:** It is expected that the passing trains in the line fitted with the system as well as adjoining lines shall contribute significant vibration and ground borne noise. Necessary vibration and noise isolation systems are essential to ensure accurate measurements.
11	**Warranty:**				
	The supplier shall confirm warranty of complete system for a period of at least 24 months from date of successful commissioning and also 03 years comprehensive maintenance after completion of warranty period.			**Wabtec:** Request delete 'at least' before 24 months **Premier India Agencies:**Partial comply 24 months from successful commissioning or 26 months from installation, whichever comes first	**Wabtec:** clause is revised. **Premier India Agencies:** This is standard condition of procurement in IR. **The clause is revised.**
12	**Training:**				
	The supplier shall provide training for minimum 40 man days per system installation at factory premises and training for minimum 50 man days per system installation at depot premises of consignee or mutually agreed location/ facility in following areas:			**NEXTSENSE:** 3 days on site training for max 10 operators **SWASTIK OVERSEAS /RIFTEK REMARKS:** Too many people how it will be organized. **Wabtec:** 40 man days per system for 50 WPMS will be 2000 man days in total at factory premises. Assuming training will be for 7 days, it means 285 personnel will have to be trained at the factory. Factory does not have infrastructure to train such a large number of trainees. **Premier India Agencies:**Partial comply DMA will provide training for 5 to 10 man-days	**NEXTSENSE/ SWASTIK:** The Factory premises training requirement has been reduced. A single shot field level training is not expected. This shall be required as per the roll out schedule of sites across India. **WABTEC:** It is not clear how the requirement for 50 systems has been assessed. Training can be phased over the roll out cycle of equipments. The Factory premises training requirement has been reduced. **Premier India Agencies:** Training shedule of individual firm can not be commented. **The clause is revised.**
12.1	Operation of the System				
12.2	Calibration of the System				
12.3	Trouble shooting and Maintenance of the System				
12.4	Reading and interpretation of reports, alarms and SMS's etc.				
13	**Submission of documents:**				

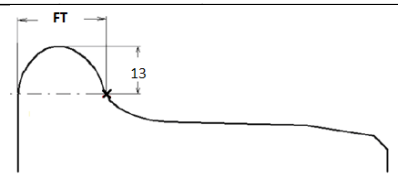
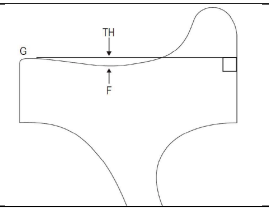
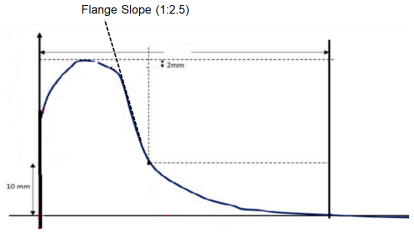
13.1	**Test certificates:** Test records, test certificates, evidence for conformance to this specification & IP ratings of enclosures, sensor's data sheet, performance curves from OEM (if applicable) and it's warranty etc. Results of all inspections and tests, whether witnessed or not by IR personnel, shall be supplied as soon as practicable after performance of each inspection or tests. One set of above mentioned documents shall be supplied properly bound in books. The softcopies of the said documents should also be provided by the firm.	**COFMOW :** Timing of Document Submission: The specifications mentions supplying documents "as soon as practicable after performance of each inspection or tests." Adding a more specific timeframe or deadline for submitting these documents could avoid potential delays. **Premier India Agencies:** Clarification required DMA will provide what is available. Additional certificates may be required.	**COFMOW:** Clasue is revised. **Premier India Agencies:** Individual arrangements between OEMs and Indian agencies cannot be commented upon **The clause is revised.**
13.2	**System Literature:** The supplier shall provide following literature in two copies to consignee along with the delivery of the Measurement System.	**Premier India Agencies:** Comply no comments	
13.2.1	Complete drawings and system architecture.	**Premier India Agencies:** Only overall drawings and installation drawings. System architecture is outlined in the Equipment technical description.	**Premier India Agencies:** No specific query is raised.
13.2.2	Operating manual		
13.2.3	Maintenance manual		
13.2.4	Trouble Shooting manual	**Premier India Agencies:** Included in User and Maintenance manual	**Premier India Agencies:** No specific query is raised.
13.2.5	Calibration and validation manual		
13.2.6	Spare part catalogue		
13.2.7	The tenderers shall provide a list of literature to be supplied with the system in his offer.		
	Part-B		
	Technical Requirement for Equipment		
14	**System Capability:**		

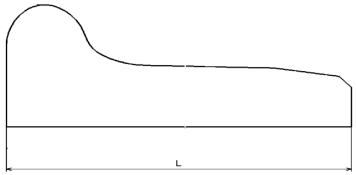
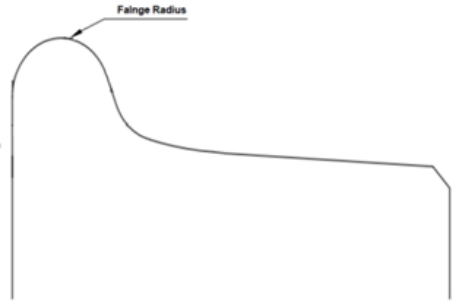
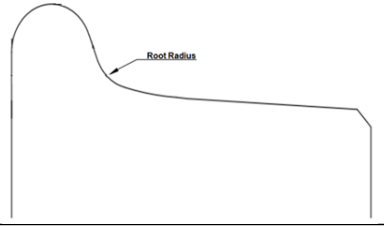
	The WPMS is capable for non-contact measurement the railway wheel profile's parameter listed in para 18. The condition of the wheel set is monitored over repeated pass-byes and preventive measures can be planned for necessary repairs. The system shall be 'easy to use' and not require any contact with the wheel.	**Premier India Agencies:** Comply No comments	**Premier India Agencies:** No specific query is raised.
15	**Main Sub system of WPMS:**	**Premier India Agencies:** Partially comply	**Premier India Agencies:** No specific query is raised.
15.1	Scanning/ Imaging System including trigger sensor for switching on/off.	**Premier India Agencies:** Provided	**Premier India Agencies:** No specific query is raised.
15.2	Air conditioning and purging systems as required	**Wabtec:** It is recommended that purging should be a mandatory requirement for WPMS. **RT VISION Technologies Pvt. Ltd.:** ~~Air conditioning~~ Cooling or purging system as required. Consignee some time may interpret as both purging and cooling required. **Premier India Agencies:**Provided if necessary	**Wabtec, RT Vision, Premier India Agencies:** Clause is revised.
15.3	Equipment protection as given in para 8 of Part -A	**Premier India Agencies:** Provided if necessary	
15.4	RFID Identification device for Rolling stock	**Wabtec:** Please confirm that RFID tags to be provided and installed by Indian Railways. **Premier India Agencies:** see comment No. 4.14 in Part A Is Vande Bharat is part of the rolling stock? Does all wagons, ICF, LHB, BV are fitted with RFID reader? What is the meaning of BV? Simply by RFID alone it is not possible to identify the type of rolling stock. For that camera vision system is required. Kindy confirm if it is possible to identify the rolling stock by the number printed on the rolling stock? If not a more elaborate system is required to identify the rolling stock.	**Wabtec:** RFID tag are already available in rolling stock. Appropriate RFID tag readers and their integration shall be in the scope of system providers. **Premier India Agencies:** Refer to reply on Para 4.14.
15.5	Control Device	**Premier India Agencies:** Provided	
15.6	Communication system	**Premier India Agencies:** Provided	
15.7	Power Supply system	**Premier India Agencies:** Provided but as outlined in comment No. 3.1.4 in Part A	
15.8	Vibration Isolation System	**Premier India Agencies:** Provided	
15.9	Suitable enclosure/hut/cabinet for housing of electronics and other components	**Premier India Agencies:** Provided	

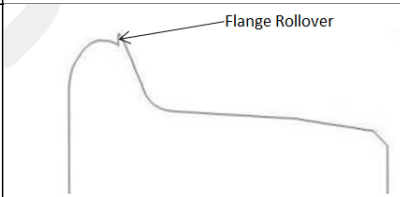
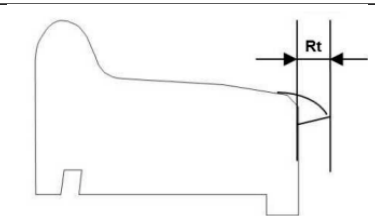
15.10	Software & Hardware for evaluation of parameters.		**Premier India Agencies:** Provided	
15.11	Any other components required for the satisfactory running and calibration of the WPMS system		**Premier India Agencies:**Calibration tools provided	
16	**Technical Requirements:**			
16.1	The system should be designed for non-contact automatic measurement of parameters of wheel sets as per para 18.		**Premier India Agencies:** Comply No comments	
16.2	System should record multiple (Minimum 6) wheel wise parameters around the circumference of the wheels (their average value and spread for each wheel) in the tabular format as per Annexure-2		**Wabtec:** Wabtec WPMS generates measurements from 6 wheel profiles at 6 locations on the tread. Measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the "final" measurements from the wheel. Please revise the requirement accordingly. **Premier India Agencies:** Please see comments in clause 4.10 in Part A Please note that this clause is suiting the design feature of one particular manufacturer. How does it matter to IR as to how many measurements are taken as long as accuracy parameters are achieved? Please delete this clause.	**Wabtec:** Refer to reply on para 9.10.5 **Premier India Agencies:** Please see remarks in para 4.10 **The clause is revised.**
16.3	The average values of each parameter of the wheel shall be reported and plotted to generate the wheel profile.		**Wabtec:** Wabtec WPMS generates measurements from 6 wheel profiles at 6 locations on the tread. Measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the "final" measurements from the wheel. Please revise the requirement accordingly. **Premier India Agencies:** Comply No comments.	**Wabtec:** Refer to reply on para 9.10.5
16.4	Alerts should be based on one or more measured parameter and alert levels should be user configurable as per IR requirement		**Premier India Agencies:** Comply No comments	
17	**Measuring Range:**		**NEXTSENSE:** Are 50kmph in workshop area necessary/useful? We feel that in workshop environment speed of 30kmph is sufficient. **SWASTIK OVERSEAS /RIFTEK REMARKS:** Resolution should be specified in which direction? raw data or final measurements? programmable or CMOS sensor resolution? Our laser scanners has linearity(measurements error), Z-axis 0.1 mm and resolution for X-axis 0.2 mm (0.1 programmable)beginning of range and 0.4 mm (0.2mm	**NEXTSENSE**: Clause is revised. **SWASTIK OVERSEAS /RIFTEK REMARKS:** The resolution indicated here is for the reading as reported. Individual systems cannot be commented upon. **Wabtec**: Individual systems cannot be commented upon. The speed of last wheel over the system for a rake headed for maintenance is likely to be close to 5kmph. Hence the suggested change cannot be incorporated
	The system should be capable to measure different parameters of following range:			
	Weel Width(Rim Width)	100 mm to 150 mm		
	Wheel diameters :	770mm to 1250 mm		
	Wheel gauge :	1590 mm to 1610 mm		

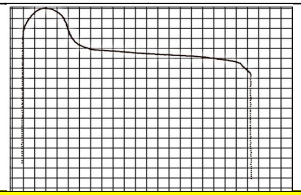
	Train Speed :	3 to ~~50~~ 30 kmph	programmable)of the end of range. **Wabtec:** Optimal operational speed for Wabtec WPMS is 10-100 kmph. Beyond this range processing rate could be affected. RDSO is requested to increase the minimum speed requirement to 10 kmph. **Premier India Agencies:**To be amended Train speed should be 03-30 kmph	**NEXTSENSE**, **Swastik/Riftek, Wabtec, Premier India Agencies:** Clasue is revised
	Resolution :	0.1 mm	**Wabtec:** RDSO is requested to clarify how the Resolution of WPMS is calculated/ ascertained.	**Swastik/Riftek:** Resolution of the system should be for final measurement of the all parameters. **Wabtec:** The Least count of the measuring value should be in 0.1 mm
18	**Parameters to be Measured**			
	A typical wheel profile of Indian Railways rolling stock follows the sketch below. This profile is extremely important because the rail wheel interaction occurs through this profile. The WPMS will measure all wheel profile parameters as well as wheel diameter, width and wheel gauge.		**Chief Workshop Engg. ECR/Hajipur:** The draft Spec. of WPMS has mentioned only Worn Wheel Profile, Sketch-91146. Since, rolling stocks with new wheel profile also exists with different railways, WPMS may encounter new wheels. The system should also identify and distinguish new wheel and worn wheel. **Dy. CME (G)/PL CWM Lower Parel Mumbai WRlys:** Wheel Defects like Wheel Shelling may occur on Wheel rim in small location and may result in changes of wheel parameter at that particular location,which may or may not be captured by WPMS. Hence include recording of wheel shelling and wheel flat defects along with other defects in parameters to be measured. **Premier India Agencies:** Comply No comments	**CWE/ECR/HJP:** System will provide profile of all the wheel whether new or worn out. The alarms are controlled by the individual defect criterion as contained in IRCA part III , IV **CWM/PL:** This is wheel profile measuerment system, hence will not detect localised defects like wheel flats
				
18.1	**Wheel diameter (D):** It is measured at a distance of 63.5mm from back of the flange face.		**Premier India Agencies:** Comply No comments	

			
18.2	**Wheel gauge:** Wheel gauge is the back-to-back distance between the inner surfaces of the wheels in a wheelset.	**Premier India Agencies:** Comply No comments	
			
18.3	**Flange Height (FH):** Measurement determination: The vertical distance between point A (the point on the tread 63.5 mm. from the back face of flange) and point B (the apex of the flange) shall be the flange height measurement.	**Premier India Agencies:** Comply No comments	
			
18.4	**Flange Thickness (FT):** Measurement determination: The horizontal distance between point D [the point D is 13 mm below the top of the flange] and the back face of the flange shall be the flange thickness measurement	**Motive Power Directorate:** At page 14, after para 18.4, Para for Root thickness (RT), at 22 mm below from top of the flange is to be added. Refer CSL-2127/M (Copy enclosed). " **SWASTIK OVERSEAS /RIFTEK REMARKS:** Its required clarification of left point, its base line or intersection profile with horizontal line. **Premier India Agencies:**Comply No comments	**MP Dte.:** Clause is revised. **Swastik/Riftek:** It is horizontal line from back surface of the wheel

			
18.5	**Tread Hollow (TH):** Measurement determination: The vertical distance between point F (the lowest point on the tread) and point G (the highest point toward the field) shall be the tread hollow measurement	**Premier India Agencies:** Comply No comments	
			
18.6	**Flange slope (qR):** Lateral distance between the flange face position measured at a height of 10 mm up to 2 mm below the top of the flange.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** Is unit degree for flange slope. **Premier India Agencies:**Comply No comments	**Swastik/Riftek:** The clause is deleted
			
18.7	**Wheel width, L:** it is calculated as the distance measured vertically between the inner and outer surfaces of the wheel.	**Premier India Agencies:** Comply No comments	

			
18.8	**Flange Radius:** Radius of flange tip is reduces to less than 5 mm is called sharp flange.	**NEXTSENSE:** Not supported yet; a definition of the area where the radius has to be evaluated is needed. **SWASTIK OVERSEAS /RIFTEK REMARKS:**Its required clarification of range of calculations, region for flange radius. What is the minimum radius? **Premier India Agencies:** Clarification required We need drawings such as para No. 18.3	**NEXTSENSE/ Premier India Agencies:**The .clause is revised as 18.3
			
18.9	**Root Radius:** The radius of the root curve reduces to less than 13 mm, the condition is called worn root.	**NEXTSENSE:** Not supported yet; a definition of the area where the radius has to be evaluated is needed. **SWASTIK OVERSEAS /RIFTEK REMARKS:** Its required clarification of range of calculations, region for root radius. What is the minimum radius? **Premier India Agencies:** Clarification required We need drawings such as para No. 18.3	**NEXTSENSE/SWASTIK/Premier India Agencies:** The clause is revised as 18.6. All drwaing are attached in specification.
			

18.10	**Flange rollover:** The flange rollover is a protrusion resulting from the deformation of the surface layers of the flange metal toward its apex.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** Its required clarification of method of calculation **Premier India Agencies:** Clarification required We need drawings such as para No. 18.3	**SWASTIK OVERSEAS /RIFTEK REMARKS:** It is measured value and not a calculated one. **Premier India Agencies:** Drawings are available in annexure of specification.
			
18.11	**Tread rollover:** The displacement of the metal from the rolling surface to the chamfer and then to the outer edge of the rim. The distance from the outer edge of the rim to the most protruding part.	**Premier India Agencies:** Comply No comments	
			
18.12	**Full wheel profile:** System should plot wheel profile of the individual wheel based on average measurement of minimum six points around the tread of the wheel. The parameter values used for plotting may be measured in the legend section of Profile drawn.	**Motive Power Directorate:** In addition to above, Flange Wear, Root Wear & Tread Wear parameters (with respect to new profile) are also to be added which are measured in the field. **SWASTIK OVERSEAS /RIFTEK REMARKS:** What is the averaging method of wheel profile ? **Wabtec:** Wabtec's WPMS generates measurements from 6 profiles at 6 locations on the tread. Measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the ""final"" measurements from the wheel. The six profiles can be reported if required. **Premier India Agencies:** To be removed This clause is specific to one particular manufacturer	**MP Dte.:** Clause is revised as 18.11 **Swastik/Riftek:**Multiple (minimum 6) readings taken at the same distance from the reference line Axle end of the wheel profile need to be averaged. **Wabtec:** Refer to reply at para 9.10.5 **Premier India Agencies:** The availability of plotted profile of the wheels is central to the WPMS system

			
	Part-C		
	Inspection and Testing of Equipment		
19	**Objective:** Inspection and testing of the equipment shall include all inspections, tests, checks, procedures etc., whether mechanical, electrical or software related as required to ensure that the supplied system meets the technical & functional requirements stipulated in the specification. The tenderer shall submit details of test plan for proposed system for each level of testing towards compliance of this specification. However any addition/deletion/modification in the test plan can be considered on mutually agreeable basis. The successful bidder shall depute team of engineers to perform all level of testing and ensure availability of testing facilities and spare parts in adequate quantity for these tests. All the instruments, apparatus, devices, sensors etc. used during all levels of inspection and testing should have valid calibration certificate issued by an independent authority/component supplier/ institute approved by NABL/IR or accredited lab. The Validation of the system shall be carried out by RDSO. The validation scheme shall be finalized with concerned RDSO, supplier and consignee.	**COFMOW 's Comments:** Test Plan Submission (19): May specify clear deadlines or milestones for the submission of the test plan by the tenderer to facilitate the smooth progress of the project. **Chief Workshop Engg. ECR/Hajipur:** **Suggested Clause:** 1. However any addition/deletion/ modification in the test plan can be considered on mutually agreeable basis in consultation with RDSO. 2. The validation scheme shall be finalized with concerned RDSO and supplier. **Remarks:** As expertise lies with the RDSO. **Premier India Agencies:** Comply No comments	**COFMOW:**Timelines are a part of the tender condition. **CWE/ECR/HJP:** Already mentioned in the last line of this clause.

20	**Factory Acceptance Test:** All technical and design features shall be inspected and witnessed by RDSO at the firm's premises. During the factory acceptance test, firm shall demonstrate the capability of the system to measure all parameters mentioned in specification. Test scheme shall be finalized by inspecting/ tendering agency jointly with the firm. Necessary facilities, equipment, tools and gauges, duly calibrated shall be provided by firm at its premises.	**Chief Workshop Engg. ECR/Hajipur:** **Suggested Clause:** Test scheme shall be finalized by RDSO jointly with the firm. **Remarks:** As expertise lies with the RDSO. **NEXTSENSE:** But we suggest a virtual presentation to reduce travel costs **Premier India Agencies:** To be amended, Validation of the WPMS system will be execute by means of a wheel's moke-up and not using real wheels.	**CWE/ECR/HJP:**Test Scheme is given in Part C of the Specification. Tender Accepting Authority may consider any deviation at the time of acceptance. **NEXTSENSE:** FAT is only possible in physical manner. **Premier India Agencies:** For the FAT, a test wheelset can be used at factory premises to demonstrate. This specification requires the system to demonstrate the ability to measure all wheel parameters in actual working wheels during field level tests in depots.
21	**Calibration Test:** The system should be calibrated before offering for proving-out test at site. Details of calibration methodology shall be submitted along-with the offer. All calibration activities should get logged on the data base or user dashboard. For this Wheels shall be provided by the consignee and the supplier shall provide and use a duly calibrated static profile measuring system.	**Chief Workshop Engg. ECR/Hajipur:** **Suggested Clause:** Wheels shall be provided by the consignee and the supplier shall provide and use a duly calibrated static profile measuring system. All further calibration shall be carried out per Para 4.15. Calibration kit to be provided by the supplier to the consignee along with the required training as per Para 12. **SWASTIK OVERSEAS /RIFTEK REMARKS:** What does it mean static profile measurement system? **Wabtec:** The static profile measuring system will have its own measurement accuracy limits (can be found in their data sheet/ product specification). The same should also be taken into account since it would lead to tolerance stack, while testing against this requirement. **Premier India Agencies:** To be amended Calibration of the WPMS system in factory and on site will be execute using a wheel's mock-up. Validation of the WPMS system will be execute usiing real wheel provided by the Operator.	**ECR/HJP:**Clause is revised. **Swastik/Riftek:** it means a system which measures the wheel parameters in static condition to be supplied by the prospective system suppliers. **Wabtec:** Noted. **Premier India Agencies:** Refer to reply of para 20 **The clause is revised.**
22	**Proving-out Tests:** First two system or 5% of the supplied system whichever is less shall be proven out by RDSO team. The Supplier, in consultation with the consignee, shall perform the following proving out tests after installation and calibration of the system:	**Chief Workshop Engg. ECR/Hajipur:** **Suggested Clause:** **Proving-out Tests:** First two system or **50%** of the supplied system **to a Zonal Railway** whichever is less shall be proven out by RDSO team. **All final verification of wheel defect results of WPMS will be done by inspecting official with the help of standard tyre defect gauge as per IRCA Part III and Part IV.** **Remarks:**ECR has been allotted 04 nos. of WPMS, and 5% of 04 is negligible. Hence, 50% of the system supplied to a Zonal Railway will make sense. **Premier India Agencies:** Comply No comments	**ECR/HJP:** Clause is revised.

22.1	**Formation of Test Train:** The test train shall comprise of 10 coaches (8 wheels each) with one locomotive (12 wheels) for which 25-40% of the wheels shall carry pre-existing defects jointly agreed by the consignee and the system provider. The test train shall be passed over the system for six movements at different speeds between 03 and 50 kmph. Typical speeds can be 05, 10, 15, 20, 25, and 30 kmph. These may vary due to site constraints.	**COFMOW:** Identification of the type of rolling stock should be delinked from capturing of data as detailed in para-1 above. Capturing raw data constitutes one aspect of the output, while the identification of rolling stock through the utilization of software and other inputs should be treated as a distinct process. Validation of raw data should be decoupled from software outputs or user requirements. **Chief Workshop Engg. ECR/Hajipur:** **Remarks:** A locomotive with defective wheel will be difficult to arrange for test train formation, as indent will be placed by C&W department. The test train with 25-40% of seeded defects can be provided in coaches and/or wagons only. **Wabtec:** Optimal operational speed for Wabtec WPMS is 10-100 kmph. Beyond this range processing rate could be affected. RDSO is requested to increase the minimum speed requirement to 10 kmph. **Premier India Agencies:**To be amended Train speed should be 03-30 kmph.	**COFMOW:** does not pertain for this clause. Pls see remarks on para 1 **ECR/HJP:** Adequate flexibility in putting RS with seeded stock has been built in **Wabtec:** Please see remarks to comments in para 4.1
22.2	**Consistency Test:**		
22.2.1	All test train pass byes should be correctly recorded with regard to direction of motion (in/out), date and time of passing, speed, no. of axles, no of locomotives.	**Premier India Agencies:** Comply No comments	
22.2.2	For the above test train with 92 (8x10 Coaches + 12 Loco wheels) wheels each parameter given in Part B shall be measured at a minimum of 6 locations per pass bye. Total number of data therefore shall be. **92 (Wheels) X 11 (Parameters) X 6 (Readings) X 6 (Pass byes)** This may be presented by the system as a Raw Data report in Tabular form.	**COFMOW:** Rake length should be minimum 26 coaches and one Vande Bharat's rake should also be incorporated in testing. **SWASTIK OVERSEAS /RIFTEK REMARKS:** Is it necessary to show in portal **Wabtec:** For the purpose of consistency test it is recommended that only the final measurement may be considered. It is requested that ""6(Readings)"" may be deleted from the equation. So that equation becomes: 92 (Wheels) X 11 (Parameters) X Final Readings X 6 (Pass byes) Wabtec's WPMS generates measurements from 6 profiles at 6 locations on the tread. Measurements from one selected (based on checks within the algorithm and not the average value) profile is reported as the ""final"" measurements from the wheel. **Premier India Agencies:**Comply No comments	**COFMOW:** The same rake shall be tested repeatedly to ensure repatability and reliability of reported parameters **SWASTIK/RIFTEK:** Yes. **Wabtec:** Individual systems and undisclosed algorithms cannot be commented upon Clause is revised to reflect parameters finalized for measurement by the system

22.2.3	Minimum of 500 data points should be include to form the profile output	**SWASTIK OVERSEAS /RIFTEK REMARKS:** Is it interpolated points **Wabtec:** Please clarify. This requirement is not understood **Premier India Agencies:** To be removed This clause is specific to one particular manufacturer. As long as system is able to give required accuracy, the number of data points should be left to the manufacturer. DMA output includes 1000 points	**SWASTIC/RIFTEK/ Wabtec,:** minimum 500 discrete points shall be measured and a continous curve plotted for the profile using interpolation **Premier India Agencies:** Individual systems cannot be commented upon. It appears that DMA system satisfies requirements being greater than 500 (Minimum) points as claimed in the remark. A minimum number, nevertheless, needs to be specificed to guard against excessive interpolation.
22.2.4	The complete data report including all parameters of wheels and speed of rake passed (without missing any wheel) shall be generated. The reports of all passing rake should be generated 100% successfully.	**Wabtec:** 100% requirement imposes very high risk due to exigencies beyond Wabtec's control. **Premier India Agencies:** Comply No comments	**Wabtec:** Clause is revised.
22.3	**Reliability Test:**		
22.3.1	The reliability of the system shall be observed for the following seeded defects in wheels as a part of the test train/ rake. These defective wheels shall be jointly verified for flaws or absence of flaws before pass bye over the WPMS system.	**SWASTIK OVERSEAS /RIFTEK REMARKS:** No definitions of defect are available **Premier India Agencies:** Clarification required Please provide definitions; drawings are needed.	**SWASTIK / Premier:** Clause is revised.
22.3.1.1	Worn Root		
22.3.1.2	Tread Hollow		
22.3.1.3	Deep Flange		
22.3.1.4	Thin Flange		
22.3.1.5	Sharp Flange		
22.3.2	For this test the data shall be taken from the six Pass Byes of the test rake (comprising good wheels and wheels with seeded defects) as used in the Consistency test. The fault seeded wheels should be logged under alerts conditions by the system.	**Premier India Agencies:** Clarification required	**Premier India Agencies:** Query is not specific

<table>
<tr><td>22.3.3</td><td>The following levels of false positive and false negative shall be acceptable for each of the six pass byes individually.</td><td>Chief Workshop Engg. ECR/Hajipur: The format as in Annexure-2 should also include sample calculation for understanding of Reliability test (calculations of false +ve & -ve results) to be carried out by field engineers/consignee during Proving out test.

Wabtec: RDSO is requested to revise this clause as follows:
False positive and false negative reports shall be validated with seeded defects and should be not more than 15% and 10% respectively considering all passes of test train."
False Positive alerts reported : 15%
False negative alerts reported : 10%

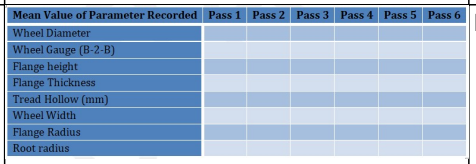
Premier India Agencies: Clarification required</td><td>ECR/HJP: Standard Enginnering and statistics terms. Greater clarity shall come from the systems validated by RDSO as has been envisaged in the specs

Wabtec: For system reliability, it is necessary to limit the false positive and negatives. The limits prescribed are considered reasonable. No reason for revision of these limits has been indicated in the query/ suggestion.
Premier India Agencies: No Clarificarion has been asked.</td></tr>
<tr><td></td><td>False Positive alerts reported : 10%</td><td>10%</td></tr>
<tr><td></td><td>False negative alerts reported : 5%</td><td>5%</td></tr>
<tr><td>22.3.4</td><td>The system should have adequate inbuilt redundancy.</td><td>Novious: adequate definition?

Premier India Agencies: Clarification required
Given the reliability of the system, the redundacy of components is not foreseen. The measurement system will be designed on a fail-safe basis. This ensures that in event of a fault, the system poses no risk to personnel or infrastructure. However, it may be unable to substain measurement activities or, in the case of a minor fault, operate in degraded mode.</td><td>NOVIOUS, Premier India Agencies: Clause is deleted.</td></tr>
<tr><td>22.4</td><td>Repeatability: Repeatability of parameters of the system should statistically satisfy ANOVA Test with 95% confidence level for the entire test rake with data as described below. The data should not indicate statistically significant variation across passes for at least 90 percent of the wheels in the test train.</td><td>Chief Workshop Engg. ECR/Hajipur: An ANOVA test format Annexure should be provided as part of the Specification with sample calculation for understanding of Repeatability test to be carried out by field engineers/consignee during Proving out test.

SWASTIK OVERSEAS /RIFTEK REMARKS: Its required Clarification of method of calculation.

ApnaTech: More detailed procedure is required

Premier India Agencies: Clarification required</td><td>ECR/HJP Swastik/Riftek ApnaTech, Premier India Agencies: ANOVA (Analysis of Variance) is a statistical tool to test for differences among the means of the population by examining the amount of variation within each sample, relative to the amount of variation between the samples. Analyzing variance tests the hypothesis that the means of two or more populations are equal. It is a standard hypothesis testing tool.</td></tr>
<tr><td></td><td> 
</td><td>Motive Power Directorate: Root thickness</td><td>Motive Power Directorate: Clause is revised.</td></tr>
</table>

23	**RFID Reader Test:** RFID readers should be capable for reading RFID Tags tagged on IRs rolling stocks. The extent of vehicle identification/ tag reading should be in line with the guidelines issued by CRIS.	**Novious:** only where present **Premier India Agencies:** Out of DMA scope Does all rolling stock are fitted with RFID tags?	**Novious:** Refer to clause 4.14 **Premier India Agencies:** Refer to reply of clause 4.14
24	New Para suggested by mermec	**Revised comment from Mermec**: Verification and validation procedure shall be part of the specifications for timely commissioning of system. We are enclosing the proposed Verification and validation procedure which MM is using for commissioning of it's systems. **Proposed content of new Provision:** The Verification and validation procedure is attached as Annexure-II	The IR validation scheme may please be followed.

Annexure-1

Wheel Profile Measuring Parameters For Coaches with Alerts						Firms Comments		RDSO Comments
Wheel Defects Limits as per Indian Railway Conference Association (IRCA) Part-IV						1	2	
SN	Parameters	Standard(mm)	Withdrawal limit (mm)	Attention Alert Level * (User Settable)	Accuracy in mm		**MP Directorate** Root thickness is to be added in annexure 1(page 19) **Mermec/Vista:** Accuracy values requested for the WPMS are too relaxed for a system meant to improve maintenance planning and extending the wheel lifecycle. With the current accuracies indicated in the specs, the system will be useless for maintenance purposes, as handheld measurement tools are already far more accurate than that. In more detail: • There is not accuracy indication for the flange height, please do not forget to include a specific accuracy requirement. We suggest specifying an accuracy up to 0.3mm. • The wheel diameter accuracy of 1.0mm is not practical since wheelsets must be verified in terms of maximum diameter difference and between different wheelsets of the bogie. We suggest upgrading the accuracy to 0.5mm. • The flange thickness accuracy at 1.0mm is useless. As a rule of thumb, when the user is reprofiling a wheel, 1mm of flange wear means 10 mm of radius cut (to restore the nominal wheel profile), therefore with1.0mm accuracy it will be impossible to improve reprofiling and saving wheel lifetime. We suggest upgrading the accuracy to 0.3mm. • There is no mention about wheel out-of- roundness (also known as radial run-out). We strongly suggest adding this parameter, correlated to wheel diameter, which is fundamental to assess the proper wheel roundness and detect defects at an early stage before they turn critical. We suggest an accuracy of 0.2 mm on wheel out of roundness. Proposed new accuracies are given in below table:	Annexure is revised
1	Wheel Diameter					**Wabtec:** For wheels that do not have a reference such as a witness groove, the diameter accuracy is +/- 3.0 mm For wheels with a reference such as a witness groove, the diameter accuracy is +/- 1.0 mm **Premier India Agencies:** To be amended Wheel diameter: based on our field experience, the value to condider is within ± 3.5 mm		
Type of rolling stock	ICF Coach	915	825	833	1			
	LHB Coach	915	855	864				
	DEMU /Train-18 (Vande Bharat)/ MEMU(MC)	952	877	886				
	MEMU(TC)	952	857	866				
	MEMU (HCC)	952	865	874				
	BOXN/BCN Wagon	1000	906	916				
	BLC Wagon	840	780	788				
	Diesel Loco & Electric Loco	1092	1016	1024				
	Electric Loco WAG 12 B	1250	1164	1172				
2	Wheel Gauge (B-2-B)	1600 (+2/-1)		>1602 or <1599 (all measurements)	0.5	**Wabtec:** (+/-1.0 mm) **RT VISION Technologies Pvt. Ltd.** 0.5 mm Flange height accuracy in mm not given		
3	Flange Height	28.5	35	34		**Wabtec:** (+/- 0.5 mm) **SWASTIK OVERSEAS /RIFTEK REMARKS:** Kindly provide the accuracy **RT VISION Technologies Pvt. Ltd.** 0.5 mm Flange height accuracy in mm not given **Premier India Agencies:** To be amended Flange height: accuracy ± 0.5 mm (Ref. to comments para No. 18.3)		

4	Flange Thickness	32 for loco & 29.4 for others	<29 for loco & <22 for Coach & <16 for Freight	Loco: 31 Coach:25.5/ 22.5 Freight:18	1	**Wabtec:** (+/- 1 mm) **Premier India Agencies:** Comply no comments
5	Tread Hollow	0	5	4	0.5	**Wabtec:** (+/- 0.5 mm)
6	Flange slope	1:2.5	-		1.0 degree	**Wabtec:** Clause 18.6 describes Flange Slope as the “Lateral distance between the flange face position measured at a height of 10 mm up to 2 mm below the top of the flange. **SWASTIK OVERSEAS /RIFTEK REMARKS:** Flange slope accuracy 2 degree
7	Wheel Width	133 for loco & 130 for others	-	-	0.5	**Wabtec:** (+/- 1 mm) .
8	Flange Radius	16 R for loco & 14.5 R for others	< 5 for others	6	0.5	**Wabtec:** (+/- 1 mm) **SWASTIK OVERSEAS /RIFTEK REMARKS**: We request to modify the accuracy of 1 mm.
9	Root Radius	15 R for loco & 14 R for others	< 13 R	13.5R	0.5	**Wabtec:** (+/- 1 mm) **SWASTIK OVERSEAS /RIFTEK REMARKS:** We request to modify the accuracy of 1 mm **Premier India Agencies:** Clarification required Root radius. We need drawings such as para No. 18.3
10	Flange Rollover	0	2	1	0.5	**Wabtec:** Presence/ Absence
11	Tread Roll Over (Rt)	0	4	3	0.5	**Wabtec:** Presence/ Absence **Premier India Agencies:** To be amended Tread rollover (RT): ± 0.6 mm
12	Full wheel profile	Plot with average				**Wabtec:** Plot the “Final”
						Wabtec: The following needs to be

*** These user settable limits are defined specifically from the point of view of inventory**

planning and may vary from one depot to another.	The following needs to be ascertained while calculating the measurement accuracies listed above • Manual wheel measurements made immediately before or after Wabtec WPMS measurements 30 * These user settable limits are defined specifically from the point of view of inventory planning and may vary from one depot to another. • Manual wheel measurements have 0.1 mm to 0.5 mm measurement error which is not factored into these numbers. This error must be factored into the Wabtec WPMS accuracy calculations • All accuracies are within 2 standard deviations of a normal distribution (95%). • Accuracies listed assume ideal rail conditions. **Premier India Agencies:** To be amended Equivalent conicity. Refer to comment para No. 18.13		