FUNCTONAL REQUIREMENT AND SPECIFICATION OF ELECTRO-MECHANICAL GATE SYSTEM FOR BALLAST HOPPERS

1. SCOPE

1.1 This functional requirement and specification (FRS) is for electro-mechanical gate system to be retrofitted on existing ballast hopper wagons to enable them to be operated through remote operation proposed on Indian Railway Network.

1.2 This functional requirement and specification (FRS) covers the brief description, function, and performance parameters for electro-mechanical gate system to be retrofitted on existing ballast hopper wagons to enable them to be operated by electrical means through remote operation from a minimum specified distance.

1.3 The scope of work within this specification includes supply, installation, testing and commissioning of electro-mechanically operated gate systems along with necessary power source duly customized for retrofitting on the existing hopper wagons used for putting ballast on Indian Railway tracks. The scope also includes monitoring and maintenance of system for a period of one year from date of commissioning. The scope further includes the annual maintenance contract for a period of three years after expiry of one year warranty period, if so considered by the concerned Zonal Railway.

1.4 Manufacturer/supplier shall also provide training to sufficient number of Indian Railway officials to make them competent to operate the equipment / system.

1.5 The manufacturer/supplier should furnish list of components/spare parts, which are expected to be required for trouble free operation and maintenance of the system for a period of 03 years after the warranty period indicating their description, part number, quantity and price. The purchaser reserves the right to purchase these spares along with the system and/or after expiry of warranty period. The manufacturer/supplier shall also guarantee availability of all required spare components to ensure trouble free service for the duration of service life of the equipment/system. For parts to be procured from the market, imported or indigenous, the sources and details should be provided. The design life should be specified by the concerned OEM.

2. GENERAL REQUIREMENTS OF THE SYSTEM:

2.1 The gate system should be able to be retrofitted in the existing ballast hopper wagons being used on Indian Railways.

2.2 The system shall be a proven one and must have worked/be working satisfactorily on any two world railway systems.

2.3 The system shall be able to be properly secured with least chances of theft and vandalism.

2.4 The system shall be easily removable from a wagon in case it is to be withdrawn from service and re-installable at minimal cost on other hopper wagon.

2.5 The system shall be robust enough and not get damaged during loading/unloading of ballast and simultaneously shall not cause any hindrance in loading/unloading.

2.6 The system shall be easy to maintain with minimal maintenance requirements. It shall be possible to attend the breakdown in least possible time. The maintainer shall be able to maintain the system after requisite training provided by supplier. Clear details regarding maintenance requirements shall be provided for satisfactory maintenance of wagon during operations.

2.7 The spares should be easily available in local markets in India. A local representative should maintain the inventory for easy availability at reasonable cost. The cost of such spare parts should be indicated in the offer.

2.8 The size and dimensions of the system with all its accessories should be such that after retro-fitment on ballast hopper wagon, no dimensions of the wagon should become an infringement to the dimensions stipulated in the Indian Railways Schedule of Dimensions (BG), Revised 2022 with its latest amendments.

2.9 The weight and placement of the system should not be such that the dynamic characteristics and behaviour of the wagon gets changed to the extent that fresh oscillation trails are required for certification of stock for commercial service.

3. FUNCTIONAL AND PERFORMANCE REQUIREMENTS OF THE SYSTEM:

3.1 The gate system shall be able to be operated by a remote wireless hand held device from a distance up to approximately 80 - 100 meters.

3.2 One hand held device should be able to operate 15-16 wagons so that only one person standing in between the length of hopper consist can operate 7-8 wagons on each side of him and thus enabling a rake of 40 wagons to be handled by a minimal nos. of personnel, preferably not exceeding 4.

3.3 Normally, ballast hopper wagons of Indian Railways are operated by two gates each on either side. The two gates on one side of a hopper wagon shall be able to be operated independently from those on other side. In case of ballasting of central crib portion of the track, the system should preferably have a provision of password for operation of inner-flap opening gate of ballast hopper wagons. The password should be with the nominated SSE/P-Way/In-charge, so that only need based operation of the inner flap can be ensured.

3.4 The gates should be able to be opened partially or fully as per requirement. The complete opening/closing time for gate should not be more than 6-8 seconds.

3.5 The hand held device for operation of gate should have a wireless system.

3.6 The operation of gates shall be with the electro-mechanical system. The system should be such that in case of failure of wireless electrical system, the normal manual operation of gates shall be possible in such a manner that the motor is disengaged automatically. There should preferably a provision **of** universal lock& key for easy operation of control box.

3.7 There should preferably be a provision of unbreakable glass window for checking the quality of transmission oil as well as level in the hydraulic tank without opening the box.

3.8 The operation panel / system shall be mounted on the end walls of the wagon so that person operating the system can stand on the wagon on the work platform available with the end walls of the wagon.

3.9 The gate system shall be with independent power source with recharging facility.

3.10 The recharging facility may be through a dynamo fitted on the axle/wheel or through power drawn from loco or solar powered. After recharging, the system should be able to work for minimum 4 hours continuously.

3.11 In case of use of solar power for recharging, the solar panel should be designed and installed in such a manner that it is very rugged, failproof from theft and vandalism. Since, these wagons are loaded by employing mechanical means and stationed unguarded during night at ballast depots and way side stations, the solar panels become prone for such issues.

3.12 The electrical / mechanical systems installed on the wagons should also be housed in a rugged, antitheft and antivandalism cover.

3.13 The present discharging capacity of gates should not be affected much. The size of gates should not be reduced by more than 10 % after retrofitting of the system and the slope of gates floor should also not be reduced significantly thus affecting the discharging capacity. Supplier should specify the discharging capacity of the gate system when open full, half or one fourth.

4. ELIGIBILITY CRITERIA

4.1 The firm should be either manufacturer of equipment / system or a business partner of OEM. It should have necessary design / development capability either in-house or should have a tie up (MOU) with OEM.

4.2 The technology/system offered by the firm should be proven one. The equipment / system proposed for supply by the firm should be working satisfactorily in at least more than 100 wagons in any two reputed Railway systems in the world for at least two years. Certificates in this regard from relevant Railway systems shall be furnished.

4.3 The firm shall possess necessary infrastructure namely manpower, machinery for undertaking execution of work of retrofitting, commissioning, training and maintaining the system during operation on IR network for the duration of the contract plus warranty period.

4.4 The supplier should possess sound technical and R&D credentials.

4.5 Firms shall submit documents in support of fulfillment of above mentioned eligibility criteria along with the offer. The decision of Railways for adequacy of furnished documents for fulfillment of eligibility criteria will be final.

5. DRAWING AND WORKING DETAILS OF THE SYSTEM:

Following documents/drawings shall be provided by the firm:

5.1 Working principle of the equipment / system.

5.2 Detailed description, function and weight of each unit of the equipment / system.

5.3 Technical literature, drawing and specification of each unit of the equipment along with details of relevant codes, if applicable.

5.4 Inspection, operation and maintenance procedure manual during service.

The offered equipment will be evaluated keeping above in view. The inspection and test plan as decided based on information provided by manufacturer will be applicable for inspection of equipment.