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भारत सरकार रेल मंत्रालय

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**WDG4 / WDP4 प्रकार के डीजल रेल इंजनों हेतु माइक्रोप्रोसेसर द्वारा
नियंत्रित एयर ब्रेक प्रणाली हेतु विषिष्टि**

Specification for Microprocessor Controlled Air Brake

System for WDG4 / WDP4 Locomotives

**विषिष्टि संख्या एम.पी.0.01.00.20
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**अनुसंधान अभिकल्प एवं मानक
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LIST OF REVISIONS

Amendment Date	Version	Revised Para	Remarks
March, 2021	05	Para 1	Not relevant in the specification. Hence, Para deleted.
		Para 3.1	The requirement is already covered in RDSO ISO procedure available on website. Hence, Para deleted.
		Para 3.4.4,4.7.1, 4.9.2, 4.15.2, 8.2.5, 8.6,	Revision of Para's to incorporate Equivalent Indian Standards
		Para 8.1	The requirement is already covered in RDSO ISO procedure available on website.
		Para 8.4	Field trial Quantity & field trial period are defined as per MP-M-8.1-1 (Latest Version). & Field trial performance feedback format added.
		Para 8.5	The requirement is already covered in RDSO ISO procedure available on website.
		Para 14	Revision of Para 14 as per ISO document no-QM-RF-7.1.3 Ver-2.0.
		Para 15	Addition of Para no. 24 (Preference to Make In India) in compliance of directives issued by GOI for promotion of Make in India policy.
		Para 16	Addition of Para no. 25 (Vendor Changes in Approved Status) in compliance to Vigilance cell note no. 13/Vig/Policy dated 08.09.2016.
		New Para 17	Addition of New Para date of enforcement as per Vigilance cell note no. 14/Vig/08/CT/46 dated 14.10.2015.
		Annexure-A	Revision of Annexure-A due to delete Knorr Part number.
May 2022	06	Para 3.1	In reference to ED/QAM/RDSO letter no. QAM/Vendor Policy dated 15.02.22 for review of restrictive clauses and further discussion during, DG review meeting held on 17.03.22 in which the issue of restrictive clauses was discussed. To promote Government of India policy on "make in India" and for development of more vendors for the subject item (this item is having less than 3 vendors), the restrictive clause has been amended.
		Para 8	Revision of Para 8 to incorporate Independent safety Assessors ISA
September 2022	07	Para 3.1 & 3.2	Revision of Para 3.1 as per RDSO QAM Note no. QAM/Vendor Policy dated 15.02.2022.

Contents

S.No	Description	Page No
1	Scope	1
2	Basic Relevant data of Locomotive	1
3	General Conditions	2
4	Technical Requirements	3
5	Additional Requirements of Brake System	10
6	Scope of Supply	11
7	Literature And Drawings	11
8	Inspection, Testing And Approval	12
9	Performance Guarantee	14
10	After Sale Service	14
11	Indigenisation	14
12	Deviations	15
13	Training	15
14	Quality Assurance Plan	15
15	Preference to make in India	16
16	Vendor changes in approved status	16
17	Date of enforcement	16
18	Annexure A	17

Specification for Microprocessor Controlled Air Brake System for WDG4 / WDP4 and ALCo Locomotives

1. SCOPE

This specification covers the functional requirement of Microprocessor Controlled air brake system for WDG4, WDP4 and ALCo diesel locomotives and this specification would assist in purchase, inspection, testing and acceptance requirements. This Microprocessor Controlled air brake system will be fitted on new WDG4, WDP4 and existing/new ALCo diesel locomotives.

2. BASIC RELEVANT DATA OF LOCOMOTIVE

Basic data of **WDG4, WDP4 and ALCO** diesel locomotive relevant to brake system is as under:

2.1 Capacity of compressor:

Compressor capacity (FAD) at 10 kg/cm² pressure:

S.No.	WDG4 & WDP4 diesel Locomotive		ALCO diesel Locomotive	
i)	200 rpm. (Idle speed)	990 lpm	350 rpm. (Idle speed)	2130 lpm
ii)	950 rpm (Max. speed)	5677 lpm	1050 rpm (Max. speed)	6390 lpm

Nominal bore diameters of four major pneumatic pipes used on air brake locomotive are as under:-

S.No.	Name of pipe	WDG4 & WDP4 diesel Locomotives	ALCO diesel Locomotives
i)	Brake pipe	32 mm	32 mm
ii)	Feed pipe	32 mm	32 mm
iii)	Brake cylinder equalising pipe	19 mm	15 mm
iv)	Main reservoir E.Q. pipe	25 mm	25 mm

2.3 Basic data related to locomotives is as under:

S.No.	Parameters	WDP4 & WDG4 locomotives	ALCo locomotives
i)	Max. Weight of locomotive	126t(WDG4), 117t(WDP4)	123 t (WDG3A) 117 t (WDM3D)
ii)	No. of brake cylinders on loco	8	8

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Specification For Microprocessor Controlled Air Brake System For WDG4 / WDP4 and Alco Locomotives

iii)	Bore diameter of brake cylinder	8 inches	8 inches
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2.4 Length of the train is as under:

- | | | | |
|----|---------------------------|---|--------------------------|
| .1 | Air brake passenger train | = | 26 coaches |
| .2 | Air brake freight train | = | 58 BOXN |
| .3 | Locomotive used | = | Upto 5 nos. in multiple. |

2.5 Relevant data of coaches and wagons are as under:

S.No	Type of Rolling stock	Length of stock (in mm)	Brake pipe diameter (in mm)	Feed pipe diameter (in mm)
1.	Air brake coach	22297	25	25
2.	BOXN wagon	10713	32	-
3.	Diesel locomotive	17120	32	32

2.6 Maximum permissible speed of train:

Type of stock	Air brake stock
Passenger	160 kmph
Freight	100 kmph

2.7 Maximum down gradient - 1 in 30

2.8 Operating Voltage

The electro-pneumatic or electrical devices, shall be suitable for 72 volts DC on diesel locomotive. The voltage variation on diesel locomotive may be between 48 and 90 Volts.

3. **General Conditions**

3.1 Facilities of the vendor applying for approval

The vendor should have qualified and competent design personnel acquainted with the design and manufacturing technology required for brake system manufacturing.

3.2 The vendor or its collaborator should have at least following facilities:

- .1 Manufacturing facilities required for manufacturing of Microprocessor Controlled air brake system.
- .2 Testing facilities to test performance of Microprocessor Controlled air brake system and individual brake valves

3.3 Service Conditions

The equipment shall be capable of working satisfactorily under the service conditions indicated below:

3.3.1 Altitude

Mean sea level to an altitude of 1000 meters above mean sea level.

3.3.2 Temperature

0° C to 55° C. The air temperature inside locomotive may reach as high as 70° C.

3.3.3 Relative Humidity = Up to 100%.

3.3.4 Vibrations And Shocks

Vibration testing shall be done in accordance with IEC-61373 or Equivalent Indian Standards.

3.3.5 Other Conditions

Equipment shall be capable of operating efficiently in spite of dirt, dust, mist, torrential rain, heavy sand or stone storms and presence of oil vapors and radiant heat etc. to which the rolling stock is normally exposed in service.

4. TECHNICAL REQUIREMENTS

4.1 The brake system offered should be Microprocessor Controlled air brake system of proven design. It should be compatible with air brake train with RDSO specification No.02-ABR-02.

4.2 Panel (Brake Rack)

It should be panel mounted brake system of compact and modular design. The envelope size of panel shall not be more than as mentioned below:

- (i) Length of Panel across the center line of locomotive = 1450 mm
- (ii) Width of Panel along with the center line of locomotive = 590 mm
- (iii) Height of Panel perpendicular to the center line of locomotive = 775 mm
- (iv) Weight of Panel with equipment shall not be more than = 225 Kg

4.3 There should be a provision of Brake Controller selector switch (mounted on brake controller) with four positions (Helper, Trail, Lead, Test in sequence from left to right) on each control stand.

- 4.4 The brake system should be capable of giving graduated application and release of brake on locomotive as well as on train for air brake system.
- 4.5 There are two control stands/cabs on locomotive. At a time one control stand will be used to control loco/train and brake system. Driver's brake valves are to be provided on both the control stands/cabs. Arrangement should be there to make brake valves inoperative on control stand which is not being used to control loco/train and brake system. However, it should be possible to apply emergency brakes from the control stand which is not being used.

4.6 **Driver's brake valve**

The Driver's Brake valve (Controller) shall be electronic based, and act as interface between the Brake system and the Driver (Man-Machine Interface). The communication between driver's brake valve (Controller) and micro-processor based air brake system should be through optic fibre cable. The interface cable provided for power supply or network connection must be shielded. Driver's brake valve (controller) shall have handles for operation of the Independent and Automatic brakes. Each of the two driver control stands of the locomotive shall be provided with Electronic Brake Valve (controller).

4.6.1 Independent brake valve

The locomotive brake system should be provided with self lapping type independently operated brake valve on each control stand. The brake valve should have two positions namely 'Release' and Full Service. In between Release and Full Service, the brake cylinder pressure built up should be in proportion to the handle movement.

4.6.2 Automatic brake valve

4.6.2.1 Automatic brake valve shall be self lapping type and shall have separate 'Release' and 'Run' position as per UIC code. The 'Release' position should be spring loaded. Following detent positions except release should be provided on automatic brake valve:

- .1 Release position - spring loaded
- .2 Run position
- .3 Minimum reduction brake application
- .4 Full service application
- .5 Emergency application position

4.6.2.2 In 'Release' position of the brake handle, an increased area of communication between the MR (Main Reservoir) air feed and brake pipe charging valve should be available to facilitate quick recharging of air brake pipe. However, in 'Running position' of the automatic brake valve, the passage between MR and brake pipe charging brake unit shall be restricted for maintaining leakage in the train system.

- 4.6.2.3 In between minimum and full service position, the brake pipe pressure built up /exhaust should be in proportion to the handle movement.
- 4.6.2.4 In emergency position of brake valve handle, the brake pipe shall be vented to atmosphere through a sufficiently large diameter opening in such a way that the BP pressure comes to atmosphere level in 1 to 3 seconds maximum when the locomotive is tested separately. The emergency position in driver's brake valve should be independent of normal brake control system and be available for use at all times at both the control stands/cabs irrespective of the presence of locomotive power or battery power. Whenever emergency brake application occurs, engine should come to idle in co-ordination with Loco Control Computer (LCC).
- 4.6.3 Position of driver's brake valves: Independent and automatic brake valves combined into one module shall be fitted on control stands such that movement of handle is in vertical plane with 'push to apply'.
- 4.6.4 It should be possible to release the locomotive auto brakes by the driver even when the partial or full service application brakes on trailing stock are made.
- 4.6.5 Assistant Driver's Emergency Brake Valve

In addition to the emergency brake application position on automatic brake valve, two Assistant Driver's emergency brake valves (one on or near each control stand) shall be provided for direct venting of brake pipe pressure during emergency by the driver /driver's assistant. Venting shall be through a sufficiently large diameter opening in such a way that the Brake pipe pressure comes to atmosphere level in 1 to 3 seconds when the loco is tested separately. During emergency brake application by emergency brake valve or through driver's automatic brake valve, system should go on penalty and engine comes to idle. However this valve is not within the scope of supply of the vendor of Microprocessor Controlled Air brake system.

- 4.6.6 Microprocessor Controlled Brake System shall have sufficient safety provisions for acknowledgment of system penalty brakes, by the driver to prevent un-intended automatic release of brakes applied as a result of various penalties as above.

4.7 Distributor valve

- 4.7.1 A pneumatic back up brake has to be provided, so that even in case of failure of the CCB or because of power failure etc, brake will be applied in the locomotive. The back up protection is required also to ensure graduated application and release of brake in case the loco with micro-processor based air brake system is attached dead. If the Microprocessor Controlled Air brake system is with a distributor valve, it should be only of UIC approved type or Equivalent Indian Standards. However, if the offered system is without UIC type or Equivalent Indian Standards distributor valve, the application/release timings and other features of the system should be as per relevant UIC specification or Equivalent Indian Standards.

- 4.7.2 The distributor valve shall have provision for goods / passenger selection to obtain brake application and release timings to match with the train requirements. Selection between these two modes should preferably be built in the software of Microprocessor Controlled Air brake system. However, manual arrangement for selection may be provided as an alternative.

4.8 Multiple Operations

- 4.8.1 A maximum of 5 (five) locomotives shall be used in multiple operation.
- 4.8.2 In case of parting between coupled locomotives, the brakes on the locomotives shall come on automatically. UIC type break-in-two protection should also be provided to bring the engine to idle in all the locomotives through locomotive control microprocessor. There shall be complete isolation of brake cylinder equalizing pipe when parting between locomotives occurs.
- 4.8.3 When Brake Controller selector switch (L/T- switch) is in 'Lead' position, it should be possible to apply & release brakes from Brake Valve Controller. When the switch is in 'Trail' position, brake valves should be inoperative. However, in trail position, it should be possible to apply emergency brakes. In Helper mode, it should be possible to operate the independent brake and also apply the emergency brake.
- 4.8.4 In case, in leading locomotive, both control stands are wrongly set in 'Trail' position or both control stands wrongly selected in 'Lead', it should not get powered. For this purpose a suitable interlock should be provided with locomotive communication control (LCC) microprocessor based control system.

4.9 Overcharge Feature

- 4.9.1 Microprocessor based air brake system shall have an automatic overcharge feature which gets activated, whenever the brake valve handle is held in Release position.
- 4.9.2 Operation of overcharge feature shall increase the brake pipe pressure by 0.5 kg/cm² over the normal level of 5.0 kg/cm². The overcharge so created by this feature, should automatically be maintained till handle is placed in Release position. The rate of drop in brake pipe pressure with the removal of such overcharge should be at uniform and slow rate so as not to cause brake application on any of the vehicles in the train. The dissipation time of BP pressure from 5.5 to 5.0 kg/cm² shall be as per UIC standards or Equivalent Indian Standards.
- 4.9.3 During assimilation or bleeding down of overcharge pressure it should be possible to apply normal brake. However, when the normal brakes are released remaining overcharge cycle should be completed.

4.10 Interface with dynamic brake

- 4.10.1 Brake system should be compatible with existing rheostatic dynamic brake provided on locomotives. During service braking through automatic brake, dynamic brake is the preferred operative mode for braking on locomotive, and as such dynamic brake shall be optimally used.
- 4.10.2 When dynamic brakes are applied, locomotive brakes should be cut off, if brakes are applied through automatic brake valve. However, in case of emergency brake application by driver's brake valve or by Assistant Driver's emergency brake valve, the dynamic brakes should 'cut-off' and locomotive brakes should apply.
- 4.10.3 In case train is being controlled by dynamic brake on locomotive and automatic brake on the trailing stock, if the dynamic brake fails, air brakes on locomotive should be automatically applied in proportion to the position of automatic brake handle.
- 4.10.4 The vendor shall offer Air / dynamic blending system. The details of equipment along with description and principle of operation should be submitted.
- 4.11 Rubber components, such as diaphragm and ' o ' rings etc. whenever used on brake system and their controls shall be entirely suitable for humid and hot environmental conditions in India.
- 4.12 Overhauling of the pneumatic valves should not be required before six years.

4.13 Self Test

There shall be a facility for conducting self test, as and when desired, in which the functioning of the brake system and its interface shall be checked thoroughly. In case the system does not pass the self test, the nature of fault shall be displayed. In case of serious fault affecting safety, the locomotive should not be allowed to move unless the fault is rectified.

4.14 Self Diagnostic Feature

Microprocessor Controlled air brake system should have self diagnostic feature. It should include fault diagnosis and display (Transparent EMI protected window should be provided on Microprocessor Controlled air brake Computer so that fault code is easily visible to the driver). The vendor will provide complete detail alongwith additional feature, if any.

4.15 Brake system pressure and brake application / release timings.

The brake system should be capable to maintain following pressure and brake release / application timings. Where timings are not given UIC standard timings can be taken to design brake system.

4.15.1 Pressure specification

Pressure	Values
Main reservoir pressure	8-10 kg/cm ²
Brake pipe pressure	5.0± 0.1 kg/cm ²
Feed pipe pressure	6.0± 0.1 kg/cm ²
Full service- reduction in BP	1.6 to 1.8 kg/cm ²
Minimum service- reduction in BP	0.3 to 0.5 kg/cm ²
Maximum independent BC pressure	For WDG4 & WDP4 5.1± 0.1 kg/cm ² For ALCO 3.5± 0.1 kg/cm ²
Maximum auto brake cylinder (Arrangement should be there to adjust BC pressure)	1.8 kg/cm ²

4.15.2 Standard timings

Application and release timings with automatic brake valve, shall be as per UIC specification (UIC CODE 540,5th edition) or Equivalent Indian Standards

4.16 Pressure gauges

4.16.1 Following gauges are available in the driver cab to indicate air pressure level in various parts of the system.

- .1 MR pressure gauge
- .2 Feed pipe pressure gauge
- .3 Brake pipe pressure gauge
- .4 Airflow indicator
- .5 Brake cylinder pressure gauge
- .6 Any other gauge which is required as per the system offered.

The above gauges are not within the scope of supply of the vendor of Microprocessor Controlled air brake system.

It is the responsibility of the vendor of Microprocessor Controlled air brake system to provide suitable pneumatic signals for the above gauges as per existing locomotive air piping diagram.

Digital display in analog form for all the above mentioned pressures may be offered as an optional item.

4.17 Air Flow Indicator

Locomotive is provided with air flow indicating device (indicator gauge) to show air flow to the brake pipe. It is the responsibility of the vendor of Microprocessor Controlled air brake system to provide suitable pneumatic signals for the above flow indicator as per existing locomotive air piping diagram. The gauge indicates normal as well as abnormal/excessive air flow to the brake pipe. Air flow indicator is not part of scope of supplier of microprocessor air brake system.

4.18 Banking Operation

4.18.1 The brake system shall have necessary provision for using these locomotives as banking locomotives.

4.18.2 When locomotive is used for banking operation it should not be possible to charge / release the brakes from banking locomotive. However, it should be possible to apply emergency brakes on the train, if required, by the banking driver.

4.18.3 It shall be possible to apply & release locomotive independent brakes of bankers.

4.19 Dead Engine Feature

While hauling a dead locomotive as a trailing locomotive, provision shall be made for application and release of brakes on this locomotive from the leading locomotive. While hauling a dead locomotive as a piped vehicle (MU pipe not connected), provision shall be made for application and release of brakes with the help of distributor valve on this locomotive.

4.20 Loss of Power Feature

With voltage supply feed to Microprocessor Controlled air brake system getting disrupted there should be facility to apply brakes on train and locomotive by dropping brake pipe pressure.

4.21 Bail off Feature (Quick Release)

Release of an Automatic locomotive brake while retaining the train brake cylinder pressure can be accomplished by lifting the bail off ring on the independent valve handle. Locomotive brake will remain released unless the automatic handle is in emergency. In this case brakes will reapply when the bail off ring is released.

4.22 Interface with Locomotive Microprocessor

WDG4/WDP4 Locomotives are fitted with EM 2000 family microprocessor control of M/s EMD (or its equivalent designed by M/s Medha or Siemens) and ALCO Locomotive is fitted with microprocessor controls to RDSO specification no. MP.0.24.00.26 (latest revision). It is the responsibility of the successful tenderer of Microprocessor Controlled air brake system to interface with locomotive microprocessor control system using RS 485 input/output electrical and communication interface and preferably an Memorandum of Understanding with manufacturer(s) of Loco microprocessor control to this effect shall be submitted by the tenderer. RDSO may be approached to facilitate the process.

4.23 Interfacing with Piping and Wiring

Interfacing with Piping and Wiring of the locomotive shall be responsibility of the vendor of Microprocessor Controlled air brake system.

4.24 Major overhauling of locomotives would be done in six years. Microprocessor Controlled air brake system should be capable of working for six years without major overhauling.

4.25 Compatibility with Distributed Power System

Purchaser has option to install distributed power system on the locomotive in future. In such cases the Microprocessor Controlled air brake system shall be fully compatible. The vendor will provide complete details.

5. ADDITIONAL REQUIREMENTS OF BRAKE SYSTEM

In addition to the basic technical requirements given in para 4, following additional features should also be incorporated in the Microprocessor Controlled air brake system being offered:

5.1 Multi-Resetting Vigilance Control Device

VCD feature is provided as a part of microprocessor based loco control system (LCC). But it is the responsibility of the supplier of microprocessor control air brake system to interface with vigilance feature of locomotive microprocessor based control systems (LCC) as mentioned in Para 4.22.

5.2 Automatic switching 'ON' of flasher light

5.2.1 Flasher lights have been provided with on both the sides of diesel locomotives to give indication of abnormal condition to driver of the train coming from other direction.

- 5.2.2 The flasher light will glow automatically in the direction of train movement in the following emergency / abnormal situations on the train.
- .1 Parting of a train
 - .2 Emergency brake application by D1 Emergency Valve
- 5.2.3 The flasher light would not glow automatically in the following condition
- .1 Brake application and release by driver
 - .2 Alarm Chain Pulling

Flasher light is provided as a part of microprocessor based loco control system (LCC). But it is the responsibility of the supplier of microprocessor control air brake system to provide suitable signals for flasher light operation to locomotive microprocessor based control systems (LCC) as mentioned in Para 4.22.

6. SCOPE OF SUPPLY

- 6.1 The scope of supply for complete system would be similar/equivalent to that of existing CCB 1.5 system as per Annexure-A attached.
- 6.2 The following items shall not be in the scope of supply
- i Assistant Driver's Emergency Brake Valve (Para 4.5.5)
 - ii Air Flow Indicator (Para 4.16)
 - iii Auto Flasher light (Para 5.3)
 - iv Pressure Gauge (Para 4.15)

Although the above items are not included in scope of supply, but interfacing with microprocessor control air brake system is essential. Vendor of microprocessor control air brake system should make detailed study of the above items for interfacing purpose.

7. LITERATURE AND DRAWINGS

- 7.1 The tenderer shall submit brake schematic diagram alongwith description of the complete system with the offer. Pamphlets covering schematic diagram, installation drawing of complete system shall be submitted along with the offer for proper appreciation of the system offered by the vendor.
- 7.2 The tenderer shall submit testing procedure, specification etc. for different valves and brake system as a whole. The tenderer shall also indicate the maintenance facilities required for proper upkeep of the equipment. Offer should also include requirements of spares along with cost of each item for a period of 8 years. The cost of spares will also be given in the offer.
- 7.3 After the system is finalized, the tenderer shall submit copies of the instructional,

maintenance and test specifications at the rate of one copy per two locomotive covering the following:

- .1 Assembly drawings of various components and schematic diagram with description of individual item and system as a whole.
- .2 Assembly and disassembly instructions
- .3 Trouble shooting instructions
- .4 Testing procedure / specification of individual item
- .5 Overhauling kit of Valves
- .6 Overall dimensions and mounting details of individual items
- .7 Particulars of cable entry, if any.
- .8 Weight of various components
- .9 Lubrication chart (equivalent indigenous lubricant may be indicated).

8 INSPECTION, TESTING AND APPROVAL

8.1 During the developmental stage, for proper control & monitoring, RDSO will be the Controlling Agency. The supplier shall submit its offer of equipment to RDSO along with all the details of equipment as per clause 8. The firm will be inspected to check capacity and capability as per the ISO Procedure. Manufacturer will be in constant touch with RDSO for design review and prototype development. If found suitable product will be taken up further for prototype inspection.

8.2 Prototype inspection

8.2.1 The prototype inspection including stage inspection will be carried out by representative of Motive Power Dte. of RDSO/Lucknow at manufacturer's premises. Alternatively, the firm may get these tests done through Independent Safety Assessors (ISA) and submit the report to RDSO. ISA to be selected from the panel of ISAs proposed by manufacturer, after ascertaining that these ISAs and their nominated test agencies are capable to certify complete air brake systems as per this specification and have accreditation as per ISO 17065, which is meant for conformity assessment for the bodies that provide certification.

8.2.2 In general the inspection will be carried out according to UIC/RDSO specifications. Detailed type tests inspection scheme will be submitted by the vendor. The test scheme should include testing of complete system as well as testing of individual brake valve/equipment. The test scheme should indicate stage inspection and final inspection on test bench as well as on locomotive. Vendor should get prior approval of test scheme from RDSO/ ISA before actually conducting prototype inspection.

8.2.3 There should be proper test equipment/test racks at manufacturer work's premises to conduct such tests. Manufacturer shall arrange for any additional testing required during the prototype approval as per the requirements of RDSO/ ISA. The vendor shall provide, without extra charges material, tools and any other assistance which the purchaser may consider necessary for any test, examination and dimensional checking.

- 8.2.4 The vendor shall, on demand make available manufacturing drawings and specifications to the inspecting authority/ ISA at the time of inspection. Vendor will also submit the test results of the test conducted by them.
- 8.2.5 During prototype inspection manufacturer certificates of components/valves/equipment which have been purchased from outside shall be produced as a proof of quality assurance.
- 8.2.6 Electronic equipment used in the system shall be tested in accordance with IEC-60571 or any other international standard/locomotive builder own standard equivalent to IEC 60571. These tests shall be carried out for prototype testing. A certificate (original) from NABL accredited testing laboratory /or any other international reputed testing laboratory shall be considered satisfactory for this purpose or as decided by ISA.
- 8.3 Inspection of fitment of the brake system on locomotive.
- 8.3.1 The installation of first system on diesel locomotive shall be the responsibility of the vendor. Assistance with regard to labour and other facility which are available in the production unit/work shop/diesel shed of Indian Railways would however, be provided to the vendor during prototype installation. Vendor will provide all necessary guidance and technology including any special tooling or wiring etc. required for satisfactory installation of the system on the locomotive.
- 8.3.2 The fitment aspect of the system will be checked on the locomotive by the representative of Motive Power Dte./ RDSO/Lucknow and purchaser/ ISA in presence of the vendor. It is the responsibility of the vendor of Microprocessor Controlled air brake system to interface with locomotive microprocessor control system. The inspection on locomotive will be carried out generally in accordance with vendor's test plan which shall be approved by RDSO prior to testing.
- 8.4 After successful prototype development and testing, development order will be placed.
A Microprocessor Controlled Air Brake System shall be subjected to field trial. Quantity of field trial and field trial period shall be as per RDSO document no- MP-M-8.1-1 (Latest Version). Field performance feedback format is as under:

S. No.	Shed/ Rly.	Loco No.	Date of fitment	Date of failure, if any	Reason of failure	Remarks

The acceptance criteria of field trial shall be the satisfactory field performance of equipment.

8.5 Regular inspection

Regular inspection of the equipment shall be carried out by the purchaser or his nominee. The supplier shall provide, without extra charges, for material, equipment, tools and any other assistance, which the purchaser or his nominee may consider necessary for any test and examination. The supplier shall make available manufacturing drawings and material specifications of the components to the inspecting authority at the time of inspection.

Supplier will offer brake system for inspection after complete checking by them. The test results of every brake system will be submitted to the inspecting authority. Inspecting authority shall carry out all tests necessary to prove that the equipment fulfils the technical requirements, covered in this specification. However, NYT-1397 tests are mandatory or Equivalent Indian Standards.

9 PERFORMANCE GUARANTEE

The equipment supplied by the vendor shall guarantee the equipment against design and manufacturing defects for a period of two years from the date of commissioning or 30 months from date of supply which ever is earlier. Notwithstanding anything that may be specified in this specification, the final responsibility for suitability of the design shall lie with the vendor who shall undertake to carry out all modifications and alterations to equipment supplied by them for satisfactory functioning in accordance with this specification as may be necessary during guarantee period. Such modification shall be carried out on all units by the vendor free of cost.

Any damage or unsatisfactory performance of any equipment noticed during the guarantee period shall be rectified or replaced free of cost. If replaced component gives unsatisfactory performance in service, it shall be replaced by modified and improved component by the vendor free of cost.

10. AFTER SALE SERVICE

The vendor shall post one of their engineers in the base shed where such equipment is installed for a period of one year after installation and it shall be the responsibility of the vendor for satisfactory operation of the equipment for this period. Indian Railways maintenance staff shall be associated with the vendor's engineer throughout this period. The engineer would impart necessary training to the maintenance and operation staff free of cost.

11. INDIGENISATION

In case the offered system is being manufactured in country other than India, vendor shall arrange for manufacture of equipment in India by transferring the technology to a suitable organization in India. The vendor will give stage wise details of indigenization programme.

12. DEVIATIONS

- 12.1 The vendor shall submit clause wise comments from the specification and shall indicate the deviations, if any with the reasons thereof.
- 12.2 Any deviation from the standards laid down in this specification, with a view to improve the performance of the equipment shall be given with details. Supporting documents for such suggestion shall also be given with the offer.

13. TRAINING

- 13.1 Sufficient number of technicians / engineers /officers shall be trained in consultations with the purchaser / RDSO so that adequate staff is available in the field for maintenance. This training shall be at the vendor works and diesel sheds for a suitable period and shall cover maintenance and testing, brake system and design, quality control and trouble shooting.
- 13.2 Adequate numbers of maintenance manual covering schedule maintenance, maintenance practices, testing, maintenance tools, spare etc and wall charts showing pictorial view of components along with part numbers will be given. These maintenance manuals and wall charts are meant for wider circulation for Railways and fresh copies will be given with each order even if there are no changes in the design.

14. QUALITY ASSURANCE PLAN (QAP)

Supplier shall submit their internal quality assurance program in accordance with RDSO ISO document no-QM-RF-7.1.3 (latest).

Supplier shall, on demand by RDSO/ Purchaser/ Inspecting authority nominated by RDSO/ Purchaser, make the records of checks carried out during internal quality assurance available for scrutiny.

14.1 Revision of QAP

QAP is required to be revised with approval of RDSO in case of a change any of the following -

- Change in Quality Control Organisation Set-up.
- Change of official working in Quality Control Organsiation.
- Change in machines, which may affect the process/method/mode of production.
- Change of conventional machines by CNC machines.
- Change in control over incoming material such as, Sublet vendor

Inspection Criteria

- Change in control over process.
- Change in control over product.\
- Change in control over system.
- Addition of any corrective action taken to improve the system by the vendor.
- Alterations suggested by RDSO in the intervening period since last approval.

15. PREFERENCE TO MAKE IN INDIA:

The Government of India policy on “make in India” shall apply.

16. VENDOR CHANGES IN APPROVED STATUS:

All the provisions contained RDSO’s ISO procedures laid down in Document No. QO-D-8.1-11, dated 28.07.2022 (Titled “Vendor- changes in approved status”) and subsequent version/amendment thereof, shall be binding and applicable on the successful vendor/vendors in the contract floated by Railways to maintain of products supplied to Railways.

17. DATE OF ENFORCEMENT

The date of enforcement of the specification is with immediate effect i.e. i.e. date of issue of specification.

Annexure - A

The existing Scope of Supply comprises the following items:

S. No	DLW Part No.	EMD Part No.	Description	Qty. per set
1.	17061805	10633678	Brake Controller	2
2.	17450433	10631944	Electronic Brake rack	1
3.	18011020	10634104	Cable ASM CRU to Controller CRU-BVC1	1
4.	18011019	10634660	Cable ASM CRU to Controller CRU-BVAE1	1
5.	18010982	10634659	Cable ASM CRU to Controller CRU-BVC2	1
6.	18011007	1063469	Cable ASM CRU to Controller CRU-BVAE2	1
7.	18011032	10634105	Fibre Optic Cable CRU to BVC1	1
8.	18010994	10634230	Fibre Optic Cable CRU to BVC2	1
9.	17454402	-	Auxiliary Reservoir	1
10.	17454414	P.T No. 769951	CRU-CRJ9	1
11.	17454426	P.T No. 775158	CRU-CRJ10	1
12.	17454438	P.T No. 775521	CRU-CRJ11	1
13.	17454440	P.T No. 775162	VCU-VCJ1	1

Scope of supply should comprise following items or their equivalents:

Note:

1. In case exact equivalent is not offered, functional equivalent must be offered. The total no. of items comprising the microprocessor controlled air brake system may be more or less than the existing system provided that the existing locations for mounting of one no. Brake rack and two nos brake controllers are followed.
2. Dimension of the offered items should not exceed the dimensions of the corresponding items of existing CCB 1.5 system. In case any dimension of offered items exceeds the corresponding dimension of existing item, vendor must ensure the sufficient space is available on the locomotive and submit details along with the offer.
3. Mounting arrangements, piping and wiring connection etc. should be interchangeable with existing system as far as possible.