

रेल कोच फैक्टरी, कपूरथला  
RAIL COACH FACTORY, KAPURTHALA


**MD35131**

**Date: 02.06.2025**

**Sub: Issue of specification MDTS- 26422 Rev. 00**

Please find enclosed a copy of under mentioned specification MDTS- 26422 Rev. 00 for information and necessary action at your end.

**Description:** Schedule of Technical Specification for Design, Supply, Installation and Commissioning of Integrated Papis and CCTV Cameras for Bangladesh Coaches.

  
SME/FD

CQM-I, II	CPLE	CWE/Fur	CMM/ HSQ	CMM/TKJ	CWE/Shell
Dy.CMM/LHB/HSQ		Dy.CMM/G	CMT	Dy. CPLE-I, II	Dy.CMM/Fur

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Dy.CME/BD

Dy.CME/FD

<b>SPECIFICATION</b>	<b>SCHEDULE OF TECHNICAL SPECIFICATION FOR DESIGN, SUPPLY, INSTALLATION AND COMMISSIONING OF INTEGRATED PAPIS AND CCTV CAMERAS FOR BANGLADESH COACHES</b>	<b>MDTS26422: Rev.: 00 Page: 1 of 20 Date: 27.05.2025</b>
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## Introduction

### 1. General

The Schedule of technical requirements describes the Integrated PAPIS and CCTV surveillance system to be supplied and installed for Bangladesh coaches.

The supplier shall be responsible for all works required in this Schedule of technical Requirements (STR) with regard to Design ,Supply, testing and Commissioning of Complete system.

### 2. Definition and Explanation

Integrated PAPIS (GPS based) and CCTV System for BANGLADESH coaches means complete system including all related equipments such as Control unit, Modem, GPS system, LED/LCD display units, PA system, and LED display unit for outside destination Board , IP65 compliant suitable power supply, audio amplifier unit, networking etc as detailed in scope of supply including all associated sub systems and accessories, wires, fitting etc. to make the system fully functional.

This specification requires the references to the following specifications.

Specification	Description
IEC 60571	The safety and reliability requirement of Electronic Signalling equipment.
EN50155	International standard covering Electronic equipment used on rolling stock for railway application.F

### 3. Scope of Supply

- The scope of supply includes the following systems and subsystem:
- The coach wise quantities of items are as follows:

SNo	Item Description				
	Public Address & Passenger Information System Equipments	Ac first	Ac chair	Non Ac car	Power car
		QPC	QPC	QPC	QPC
1	10.1 Inch Touch Panel - Human Machine Interface(USB compatible)	0	0	0	1
2	Coach Controller with Audio Amplifier	1	1	1	1
3	Microphone for PA	0	0	0	1
4	Speakers 6W to 15W RMS with 100V LMT	12	8	8	6
5	Ambient Noise Monitoring system(ANM)	2	2	2	2
6	Graduated volume control	12	0	0	0
7	GPS Antenna with Mounting Arrangement	0	0	0	1
8	Multicolour LED outside Side Destination Boards with 16x128 mm matrix at 5mm pitch.	2	2	2	2

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9	Multicolour LED matrix inside Display with 16X144 Pixels at 5mm pitch.	2	0	2	2
10	TFT 18.5"	0	4	0	0
<b>CCTV Cameras Equipments</b>					
1	Network Video Recorder with 8 inbuilt POE Ports and 2 TB SSD	1	1	1	1
2	IP cameras with M12 plug connector for Rolling Stock Application with EN50155 certification.	6	4	4	4
1	Data and signal converters, connectors and interconnection between the system components, All type of Cable i.e power supply, control signals and data transfer required for wiring ( all cables should be fire retardant) to make system fully functional.	As per requirement			

All the modules/units shall be mounted in a IP65 compliant enclosure unit, designed with anti-pilferage . Enclosure units shall be mounted in as suitable location in the coach with mutually identified for allotted location in coach. Scope of supply shall includes all the accessories/items which may not be mentioned but are required to make system fully functional.

**Note:**

- a) 8 pin rectangular types IV coupler (including plug and socket assemblies and jumper cables) and the train line cable for data interface between IV coupler at both end shall be in the scope of contractor. The IV coupler shall be of reputed make. Firm shall get the sample approve before supply.
- b) Wiring and termination of cables between various components as required for the system (including train line cables and IV coupler) shall be in the scope of supplier. Decision of the consignee in this respect will be final and binding the on the supplier. The cable shall be E-beam cable from RDSO approved source.
- c) Any items for installation and commissioning shall be in the scope of supplier
- d) Labour, material, tools, cables, connector, fasteners, brackets etc. that is not mentioned in the specification necessary for the satisfactory functioning of the system shall be under the scope of supplier.
- e) Notwithstanding above, there can be minor modification during design/execution of the system which has to undertaken by the supplier without any cost implication.

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#### 4. Technical Specification for PAPIS, CCTV and Associated Equipment

##### 4.1 Voice Communication System

- a) The Public Address (PA) system shall have a 10.1 inch touch based HMI in the power car to control the train wide announcements so that the Train Supervisor can make announcements to the passengers from Power cars.
- b) The Public address system shall be acoustically designed and the microphone to be used for public address/announcement shall have high dynamic noise cancellation feature. The Supplier shall submit the details of system at the design stage. The microphone provided in the Power car shall be vandal proof.
- c) The Train supervisor shall have the facility of adjusting the volume level from a minimum to maximum level by using PAPIS HMI.
- d) The PA system in every coach shall have automatic continuous variable volume control, based on Car background noise level. The output volume shall be 10db above the average background noise subject to a maximum overall output of 90Db.
- e) In case of failure of one unit of PA system or a passenger communication unit in one Car, there shall not be failure of the whole system. All the communication and control cables shall be conforming to international standards suitable for Train services so that full functionality for passenger communication is maintained.
- f) Each coach shall be provided with speakers as mentioned in the BOQ. Each speaker shall be minimum 6W power rating and a feature of Line Matching Transformer. Loudspeakers shall be flush mounted and suitably protected by perforated sheet. Ambient Noise monitoring system is typically flush- mounted in the ceiling to ensure proper coverage 2 number of such system is used .
- g) The number, positioning and output of each loudspeaker and power amplifier shall be designed such that evenly sound coverage in all areas of the passenger Car is achieved.
- h) The public address amplifiers shall be protected against short circuit and outputs of the amplifier through line cable inside the Car shall be suitably insulated, screened and overall outer sheathed.
- i) Any failure of a component, which can adversely affect functionality, shall be logged by the system itself and also be communicated to PAPIS HMI for reporting to the Train Supervisor.
- j) Voice announcements shall be auto generated by the system using a GPS module built into the PAPIS HMI. Text messages for the displays shall be pre-recorded and configured into the system using the “off line” speech and route data base editor. Messages, audio or visual or both shall be in Bangla and English.
- k) The system shall be capable of making pre-recorded announcements (both audio and visual) by manual triggering from the PAPIS HMI if positional information is not available.

##### Technical Details for Coach Controller unit (CCU).

Coach controller unit should be compact and fan less devices and comply to the requirement as specified in EN50155 or IEC60571. CCU shall have following features:

1. 32/64 bit standard processor of reputed make having clock speed greater than 1 GHz.
2. Onboard flash memory should be greater than 8GB.
3. On board Ram should be greater than 1 GB.

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4. One Ethernet port 10/100 for connection with NVR.
5. Minimum two communication RS485 interface for display.
6. Train line communication interface for audio communication.
7. One output of inbuilt high power class D Amplifier for driving 8 speaker of 10W each with ambient noise measurement facility.
8. Inbuilt 110VAC to required DC voltage converter.
9. Maximum dimension of the system shall be 370mmX260 mmX140mm along with provisions for DIN Rail mount on wall / rack or mounting of the system to VESA 75 standard.

**Note:** - The above details are for reference only however Firm may provide/offer same or better or advance features of Coach control unit.

#### **4.2 Passenger Information Display System**

- i) A passenger information system (PIS) shall be provided with Internal LED display unit inside the coach and LED Destination boards outside the coach. Papis HMI shall use the GPS module to determine the Train location and shall provide automatic display of destination information on displays throughout the Train.
- ii) All elements of the PIS installation shall be designed so as to resist damage and vandalism. Information displays shall be protected by transparent covers so as to protect against damage.
- iii) Automatic messages on displays unit shall be synchronised with the PA system. Announcement by Mic shall be overriding the messages of Papis system. The loudspeaker for voice communication system and automatic PIS announcement shall be common.
- iv) The PIS shall be designed to provide information display of journey messages in Bangla and English language throughout the journey. Full facilities including any hardware/software tools for programming the displays and system shall be supplied. Supplier shall arrange training to program, edit and interface the display panels with the system.
- v) All displays shall receive synchronised display messages directly from the Papis HMI.
- vi) Two multicolour passenger information display boards (LED matrix - 16x144 at least) shall be provided inside each coach except AC Chair car. 4nos. TFT screen of 18.5" shall be provided inside AC chair car. Each display should be readable from 10 meter away from the display located in both ends. It will display the route related information such as present station and next station to the passenger throughout the journey.
- vii) The size of the letter and resolution shall be programmable and have adequate clarity and visibility for all the passengers of the coach. Detail specification, mounting arrangement and display content shall be finalized during the design stage.
- viii) Each Coach shall be provided with two multicolour LED matrix outside destination boards (LED matrix - 16x128 at least) (one on each side) in order to show the originating, destination station, Coach number, Train number etc. The mounting of the LED destination boards shall be

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sunk in type with outside LED destination cover for all type of AC coaches except Non AC coaches.

- ix) The external displays shall have adequate brightness, which shall have auto adjustment with the outside ambient light.
- x) It shall be possible for someone of normal vision to read the display from a distance of at least 10 meters under all lighting conditions. Horizontal view angle 150 degree or better (75 degree left or 75 degree right). Vertical view angle 140 degree or better (75 degree left or 75 degree right).
- xi) The external display screen shall be designed to guard against vandalism, pilferage, water and dust ingress. The encapsulation class shall not be less than IP65.
- xii) All the communication and control cables shall be conforming to international standards for fire retardant, characteristics suitable for the semi high speed train.
- xiii) The specification of LED display unit :-

<b>Parameter</b>	<b>Values</b>
LED type	SMD/ LED Tiles
LED size	3.2 mm x2.8 mm or similiar
Peak Wavelength	592 ± 10 nm
Intensity @ 20mA	63mcd to 100mcd
Viewing Angle	120° (Min)
Operating Temperature	-5°C to 85°C
Make	Avago / Nichia / OSRAM / CREE / SEOUL / Mic / Everlight / Wurth Electronics / Vishay/LUMILED.

### **4.3 Passenger Car Surveillance System**

- i) The Passenger Car Surveillance System (PRSS) shall comprise IP surveillance cameras, Network Video Recorder, cables and other accessories as required.
- ii) Each Coach of Train shall be provided with four surveillance camera devices except FAC coach where number of cameras shall be 6 no, at appropriate locations to cover the maximum passenger area.
- iii) Mounting of camera shall be unobtrusive.
- iv) Each Camera shall be IP/ Ethernet based with 2MP resolution and having day and night function. Cameras shall be POE powered and 802.3af/at compliant.
- v) Cameras shall have D-Coded M12 connectors, and have impact and ingress protection rating of IK10, IP67. Cameras shall be Onvif profile S compliant
- vi) Each Coach shall be provided with a Network Video Recorder. The NVR shall be provided with 2TB SSD for storage of footage. The recording memory shall auto-recurse on FIFO basis.
- vii) Papis HMI will show the coach wise health status (as an Indicator) of Cameras in each coach.
- viii) The visual images from each camera shall be recorded in non-volatile memory of the NVR. The on-board system should have the capacity of recording such that it can be downloaded in the maintenance depot during the scheduled maintenance overhauling. The architecture of the CCTV system shall have an NVR with a high-speed downloading port, at the coach level. Storage memory (HDD/SDD) shall be removable from NVR and shall facilitate extraction of recorded data from the docking station. The memory shall be expandable. The Supplier shall provide equipment and means for the downloading of the records.
- ix) The capacity of the memory shall be expandable. The capacity of the memory shall be sufficient enough

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to record videos up to 25 frames per second, for a minimum period of 30 days @ 24 hours per day. The picture quality will be level E as minimum at 100% Rotakin measured according to EN 50132-7. The Supplier shall provide equipment and means for the downloading of the records.

- x) IP based CCTV cameras are to be suitable for rolling stock to be worked in environments with extreme temperatures, humidity, vibration, dust. Cameras used in trains should also have EMI and surge protection to ensure consistent performance and to prevent damage to the equipment. The minimum requirements for electromagnetic compatibility in railway applications are defined by EN 50121-3-2 or IEC 62236-3-2 standards.
- xi) All cameras shall be powered over POE with M12 connector.

#### **4.4 Surveillance System Features and requirements.**

- i) NVR & cameras installed in each coach shall be provided with a unique digital identification number. This shall be used as key identifier while offloading & analysing video data at shed.
- ii) NVR unit shall provide encrypted and secured recording for evidence purposes and user authentication to protect data Integrity.
- iii) In case of loss of video signal to NVR due to failure of any one or all the cameras for any reason, there shall be an indication on touch display provided in Power Car for the respective camera. In case of disconnection/disruption in the transmitting, the NVR shall be able to resume the video data when the network gets connected without any duplication of video data.
- iv) NVR shall have the facility to allow downloading of the recording at any Intermediate station by nominated staff through laptop/exchange removable SSD drive.
- v) The system i.e. cameras and software (video management & video recording) shall be compliant to global standards ONVIF Profile 'S' for the interface of the network video product (ONVIF- open Network Video Forum). The quoted model should appear on the ONVIF website and a confirmation certificate for the offered models to be provided for the same.
- vi) Complete system viz. Power supply, NVR unit and other accessories shall be housed in concealed, powder coated metal enclosure with IP65 Ingress Protection for dust and water by providing gasket & sealing of cable entry/exit along with lock and key.
- vii) All surveillance cameras, NVRs and all sub-systems shall be mounted as per sound engineering practices duly complying with anti-theft & anti-vandalism requirements.
- viii) The system shall have self-diagnostics features and communicate the same suitably to the Train Supervisor through PAPIS /HMI
- ix) The visual Images from each camera shall be recorded in non-volatile memory in a video recorder without any limitation of repetitive writing of the data. The record shall be easily downloadable.
- x) MTBF (Mean Time between Failure) for cameras shall be 80,000 hours and for Recorder shall be 50,000 hours.
- xi) In the complete CCTV surveillance system, mostly dry type capacitors shall be used, wherever necessary. During Installation & commissioning of the system, welding shall be completely avoided for safety reasons.
- xii) It shall be possible to filter, zoom and select images in off line mode for investigation purposes. The images shall be with time stamping and It shall be possible to link them with the respective location of the train.
- xiii) The CCTV Image quality of the surveillance system will be level E as minimum at 100% Rotakin/Norman measured according to EN 50132-7.



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#### 4.5 CCTV Surveillance Saloon Camera:

- i) The camera shall be suitably selected to work in day/night in respect of resolution, clarity of images and illumination condition for on-train application and shall be of proven design. The mounting of camera shall be unobtrusive, flushed with or recessed into the interior panel and shall conform to suitable IP standard to prevent failures,
- ii) To ensure security of IP based VSS for Rolling Stock of Indian Railways (Camera & software) from vulnerabilities & breach and discourage false undertaking from OEMs, Securities auditing and testing of equipments including source code of camera and software shall be carried out from STQC (Ministry of Electronics & Information Technology only).

The camera shall conform to the following specification:

Sno	Parameter	Specification
1	Type	IP Dome camera (Vandal proof)
2	Image sensor	1/2.7" to 1/3" CMOS or better
3	Lens	2.8 mm
4	Resolution	Min. 1920 x 1080 or 2 megapixels at 25 FPS
5	Compression	H.264, H.265 or better compression
6	Min. Illumination	0.2 lux (colour)
7	Day & Night	Auto (IR) Day/Night recording Minimum 20 Mtrs.
8	Protocol	Suitable and Required network protocol
9	Back Light compression	Yes
10	White balance	Yes
11	Wide Dynamic Range	120dB

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12	Edge storage	Micro SD slot supporting memory card for min. 128 GB
13	Power supply	POE as per 802.3af with M12/M23 connector or military grade connector
14	IP Protection	IP65 (minimum)

#### 4.6 Network Video Recorder (NVR)

The Network Video Recorder (NVR) shall be of rugged design with high resistance to vibration and impact dust-resistant in a metal enclosure. The Network Video Recorder (NVR) shall conform to the following specification:

Sno	Parameter	Requirement
1	Video	Shall have minimum 8 ports & compatible with IP cameras
2	Recording Playback	Shall support Real time video recording & Playback
3	Interface	1) Power input 2) Network interface 3) POE port with M12 connector. 4) Serial interface I/O terminals 5) USB port
4	Anti-vibration	Shock & vibration conform to IEC 61373
5	IP protection	IP 65
6	Power input	Train lighting voltage is 110V AC The contractor shall provide suitable converter to convert the train lighting voltage to required device input voltage.

Software shall be able to playback recorded video stream .One or more videos streams can be selected and shown simultaneously in a multiple display. Enlarging the images to emphasis key details shall be possible. In case NVR unit operation is interrupted, like power disconnection, the NVR unit shall automatically

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resume recording of cameras on restoration of power.

The system software shall support network fault-tolerant recording such that if the network connection between the video recorder unit and camera is unavailable, the video recorder unit shall automatically recover when the connection is restored.

The system software shall support selective recording search by camera, date and time, events etc. and support export of selected video clips of desired duration to laptop.

The system software shall maintain system log such as alarms, events and operator log and any other Information considered necessary to record.

The system software shall support user management such as authentication of user login, configuration of users and user access rights.

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#### **4.7 LCD Display**

- i) 4 nos. TFT Display of size 18.5” to be provided in AC Chair car.
- ii) Resolution of the display should be min. 1366 x 768.
- iii) Display brightness should be min. 350 nits.
- iv) LCD display should have auto brightness adjustment based on ambient light.
- v) Display should be IP65 complying to IEC 60529 / EN60529.
- vi) Mounting should be adapted as per fitment requirement

#### **5. Environmental Conditions:**

The equipment shall function satisfactorily under following conditions.

Altitude: Up to an altitude of 1200 meters above Mean Sea level.

Ambient temperature: -10 to +55°C temperature of stationary rake under sun may go as high as 70°C)-

The system shall be designed accordingly.

Relative Humidity:98%

Ambient Condition: Full of dust, dirt, mist, torrential rain, heavy storms with thunder and lightning likely to generate electrical disturbances, presence of oil vapours and radiant heat etc., to which the rolling stock is normally exposed in service on Indian Railways. LHB platform rakes also run in saline, salty mist and corrosive atmosphere in coastal areas.

The maximum values of related parameters are as under:

- a) pH value: 8.5 Max.
- b) Sulphate: 7 mg/litre
- c) Concentration of chlorine: 6 mg/litre Max.
- d) Conductivity: 130 micro-siemens/cm Max.
- e) Dust concentration: up to 1.6 mg/m

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## 6. Compliances:

A high degree of electromagnetic interference is expected in the LHB platform rakes. The surveillance system shall be free from electromagnetic interference as well as interference from communication systems between motorman-guard, and control. The equipment shall be tested as per IEC 60571, EN 50155 & IEC 61000 for EMI & EMC compatibility.

## 7. Supplier Responsibility:

The contractor shall be fully responsible for supplying and laying of all the concealed cables for communication, electrical connection along with their connectors conforming to various standards of rolling stock. Cables shall be provided with ferrule marking for easy identification.

The contractor shall be fully responsible for integrated testing and commissioning of the complete integrated system of PAPIS and CCTV cameras.

### 7.1 The Supplier shall submit following documents:

1. Description of integrated of PAPIS with CCTV system along with drawings/schematic diagram.
2. Relevant certificates and data sheets from OEM conforming to the required standards for the bought-out items.
3. Test certificates issued by reputed International agencies/NABL accredited lab shall be submitted of each equipment of integrated system along with cameras, NVR, cables and other bought out items as specified in the technical specifications.
4. Interface plan Operation and maintenance manual (soft copy & hard copy @ 2 per rake)
5. Spare parts catalogue (soft copy & hard copy @ 2 per rake)
6. Authorization letter from the OEM for respective units
7. All the integrated test documents, test procedures and check sheets.
8. The Do's and Dont's for the system shall be legislated
9. Diagnostics & Maintenance software.
10. User manual for Diagnostics & Maintenance software.
11. Two backup copies of application software, Test software.
12. Clause wise comments against all clauses of this specification.
13. All required certificates as mentioned in the technical specification.
14. Installation drawings.

## 8. Inspection And Testing:

### 8.1 Type Test

Only after the detailed drawings and the design have been approved and the clearance given to this effect, the contractor shall take up the manufacture of the prototype. It is to be clearly understood that any changes, required to be done in the prototype or any additional tests other than specified herein are required to be conducted on the prototype unit or its components, they shall be done expeditiously. During the process of manufacture of the equipment, if the purchaser so desires, he may conduct/repeat any of the routine or additional tests to satisfy himself that the quality of the module being manufactured is of the required standards.

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The type tests shall be carried out by purchaser on prototype unit either totally or in part under the following conditions without any additional cost:

- A manufacturer undertakes to manufacture for the first time.
- An important change in design details of machines has been introduced.
- Specification is modified, necessitating re-designing of equipment.
- Unsatisfactory performance reported from user Railways.
- Resumption of production after an interruption of more than two years.

One no. of each item ie. IP dome Camera and Network video recorder (NVR) shall be subjected to Type Test. The supplier/manufacturer shall submit relevant certificates from OEM conforming to required standards for the bought-out items viz. SSD drive, cameras, cable/connectors etc.

Investigation tests are intended to obtain additional Information regarding the performance of the product. They shall be specially requested either by the purchaser and shall be done at no extra cost.

The tests shall be carried out at the works of the contractor/OEM or a reputed testing laboratory in presence of customer representative on the prototype unit of the CCTV system as per relevant governing specifications. The contractor shall have all possible necessary arrangements for testing of the complete system.

The test protocol indicating relevant clauses of the specification/standard, condition of the test, specified value and observed value of the parameter for CCTV system shall be submitted by the firm before offering the sample for testing.

The system shall successfully pass all the type tests for proving conformity with this specification. If any one of the equipment fails in any of the type tests, the type testing agency at his discretion, may call for other equipment/card(s) of the same type and subject it to all tests or the test(s) in which failure occurred. No failure shall be permitted in the repeat test(s). The prototype set of equipment/assemblies shall be used for commissioning trials on one of the rake. Final clearance shall be given after successful completion of above trials.

## **8.2 Routine Test**

Routine tests are to be carried out on each unit to verify that properties & design of the product correspond to those measured during type test. Proper documentation of routine test results shall be available with the firm and shall be produced before inspecting officials on demand.

## **8.3. Acceptance Test**

Each offered lot of supply shall be subjected to acceptance tests as per RDSO approved sampling plan or as per sampling plan specified in 15 2501, at the manufacturer's works.

The acceptance test shall be witnessed by inspecting officials nominated by the purchaser. Manufacturer on demand by inspecting officials shall produce the internal/routine test report carried out by the manufacturer.

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#### 8.4 Schedule of Tests:

Schedule of tests to be conducted is as below:

S No.	Description of test	Clause No.	Type test	Routine test
1	Visual check	As per relevant clause of this specification	Yes	Yes
2	Performance and Function test	As per relevant clause of this specification	Yes	Yes
3	Software burn in test	As per relevant clause of this specification	Yes	No
4	Burn-in (stress screening test)	As per relevant clause of this specification	Yes	No
5	Electromagnetic Compatibility test	As per relevant clause of this specification	Yes	No
6	Enclosure Test	As per relevant clause of this specification	Yes	No
7	Vibration and Shock test	As per relevant clause of this specification	Yes	No
8	Endurance test	As per relevant clause of this specification	Yes	No
9	Insulation test	As per IEC 60571	Yes	Yes
10	Dry heat test	As per IEC 60571	Yes	No
11	Damp heat test	As per IEC 60571	Yes	No
12	Salt mist test for 48 hours	As per IEC 60571	Yes	No
13	Supply over voltage test	As per IEC 60571	Yes	No
14	Supply Interruption test	As per IEC 60571	Yes	No

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## 8.5 Test Description:

### 8.5.1 Visual Check

During visual check general workmanship, connector, cable and wiring shall be checked. Dimensions shall be as per approved drawing.

### 8.5.2 Performance & Function Test:

- The input current, visibility of display, power consumption, etc. shall be recorded at input voltage of 110V AC.
- The test set up shall consist of a PC based testing jig for performance integrated testing at contractor premises.
- Data retention of the system shall be checked by interrupting the power supply and resuming system function.
- There should be no corruption or loss of data after power interruption.
- During Routine and Acceptance performance test, the system performance shall be verified.
- Function shall be checked as per the specification requirement.

### 8.5.3 Software Burn-In Test:

Correct burn-in of embedded software version shall be verified for each unit.

BURN-IN (STRESS SCREENING) TEST: Burn-in test shall be done on populated PCB in accordance with RDSO specification ELRS/SPEC/SI/0015.

### 8.5.4 Electromagnetic Compatibility Test:

The CCTV system shall be designed such that there will not be any Electromagnetic Interference and the test shall be Conducted for EMI/EMC with relevant clauses of IEC 61000 as under:-

i. Electrical Fast Transient/Burst immunity test: The test shall be carried out as per IEC: 61000-4-4 equipment performance criteria A		
	<b>Power lines</b>	<b>Communication and signal lines</b>
Pulse repetition rate	2.5 KHz	5 KHz
Voltage peak	4 KV	2 KV
ii. Surge Test: The test shall be carried out as per IEC: 61000-4-5. Installation class: 4. Test level: 4 KV		
iii. Electrostatic discharge: The test shall be carried out as per IEC: 61000-4-2 a) Enclosure conductive part-contact discharge test at 6 KV b) Enclosure Insulated part-air discharge test at 8 KV		
iv) Radiated susceptibility test: As per IEC: 61000-4-3		

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#### **8.5 Enclosure Test:**

This test shall be done as per IEC 60529.

#### **8.6 Vibration And Shock Test:**

The Equipment shall be subjected to vibration, shock and simulated long life testing as per IEC 61373 latest version.

- Random vibration test as per clause 8 Table 1, category 1, Class B
- Simulated long life and random vibration test as per clause 9, Table 2, category 1, Class B
- Shock test as per clause 10, Table 3, category 1 Class B

#### **8.7 Endurance Test:**

Endurance test shall be conducted on one complete system for continuous operation which shall be 72 hrs at ambient room temperature without giving any deterioration of equipment performance.

#### **9. Training:**

The contractor shall provide free of cost training to Railway personnel/staff of Users Railways in the operation, troubleshooting and maintenance of CCTV system and software. Training shall include complete assembly of the system through the use of various modules, integrated of hardware, loading of software and complete operation of the system.

#### **10. Prototype Approval**

- a) Irrespective of any approval, successfully functioning of system shall be the responsibility of supplier.
- b) Prototype approval from concerned IR representative shall be obtained before bulk supply by the supplier based on the fitment and functionality checking of the system in one rake of coach.
- c) Any change or deviation in drawing, material supplied or any other approved delivery shall need re- approval from concerned IR representative.
- d) All applicable test certificates, data sheets or any pertaining document shall be provided by the firm.

#### **11. Installation and commissioning**

- i. Firm shall install and commissioning the system as as approved drawings.
- ii. Positive and negative wire shall be segregated by placing them in separate conduits.
- iii. MCB of adequate rating shall be provided for electrical safety purpose
- iv. Code of practice for prevention of fire in coaches no. RDSO/PE/0/008-2005(Rev.'0' for wiring shall be followed..



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## **12. Packing:**

Supplier shall ensure proper packing of each items of the system to avoid damage during transit, handling and storage.

## **13. Warranty:**

The whole integrated system shall be warranted for a period of two years from the date of commissioning.

## **14. Marking:**

All the individual units shall be provided with a name plate with QR coding on the enclosure units and all major equipments.

The following information shall be clearly marked on above mentioned marking plate with etched/engraved/laser printed and in form of QR code at a suitable place on each equipment:

- a. Name and Address of the manufacturer.
- b. Year of the manufacturer.
- c. Serial number of Equipment
- d. Specification number
- e. Software and hardware version
- f. Schematic diagram of the equipment on the side of the cover.
- g. The first two digits shall indicate the year of manufacture, next two digits month and Next three digits for manufacturing
- h. Serial number.

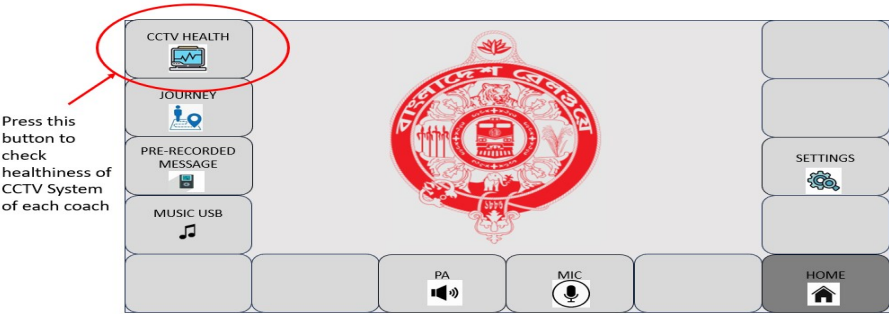
Following description shall be etched/engraved/laser printed etc. on the component side of the PCB:

- a. Component outline in the proximity of the component
- b. Manufacturer's name
- c. PCB name
- d. Part number
- e. The manufacturing serial number.

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**Samples of HMI screen in Power Car for reference only.**

1. The Home screen of HMI will be shown like given below:



1.1 The LED of Health Icon is provided with Green/Red colour mean that the CCTV of all the coaches are working. It becomes Red that means coach is not working and after touching this Icon following screen will open. Coach wise position of CCTV will be shown in this screen. Green LED means CCTV is working and if Red that means CCTV is not working. (Consider 6 CCTV in WJC & 4 CCTV in rest of Coaches).



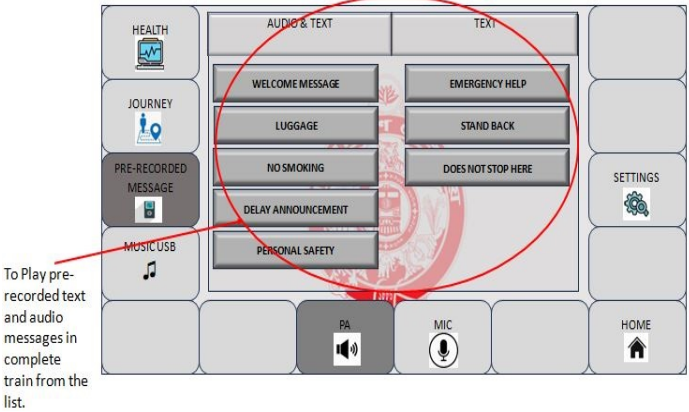
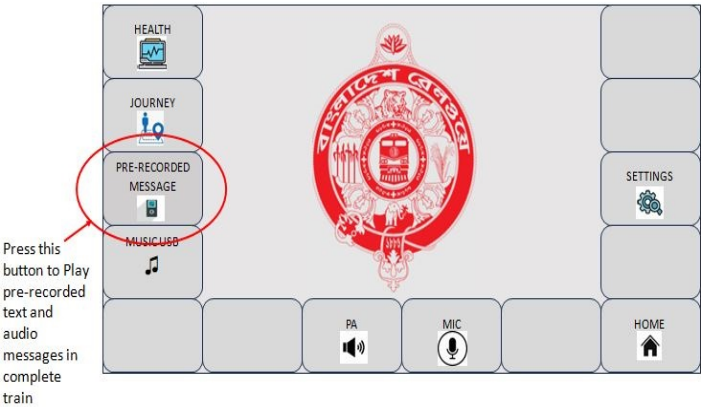
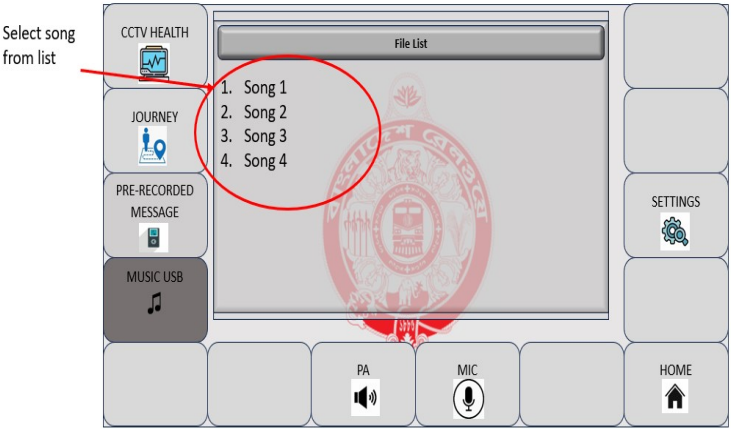
1.2 For PIS, Journey Icon will be selected and entering the pre feed journey -route, it will be shown in the outside destination boards and PIS inside display unit of the coaches



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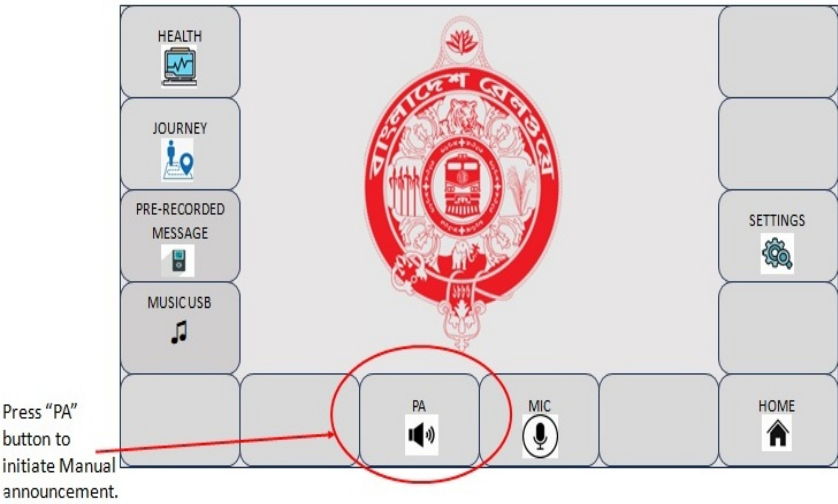


1.3 Pre-Recorded piped music/audio messages will be played in the coaches, if Pre-Recorded piped music icon is selected. Additional options for selection of piped music files can be incorporated .Songs from USB drive will be if USB icon is selected.

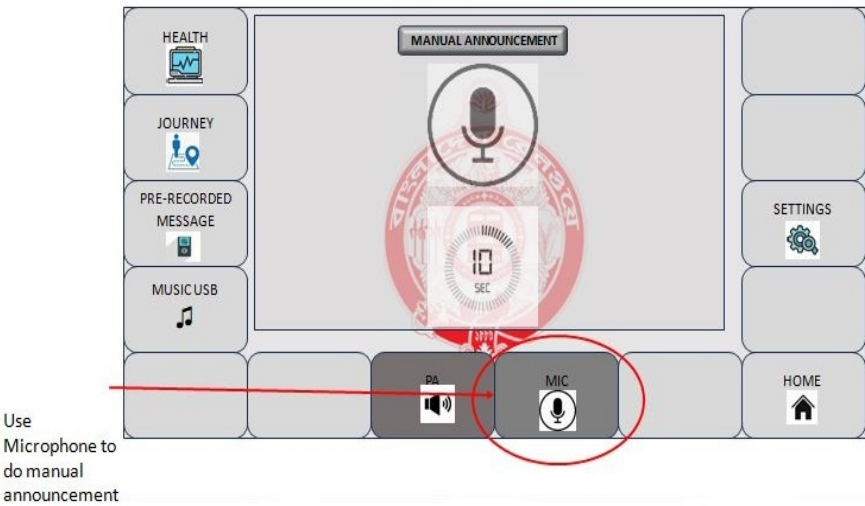


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1.4 Following Audio and test message will be played in the coaches if PA icon is selected.

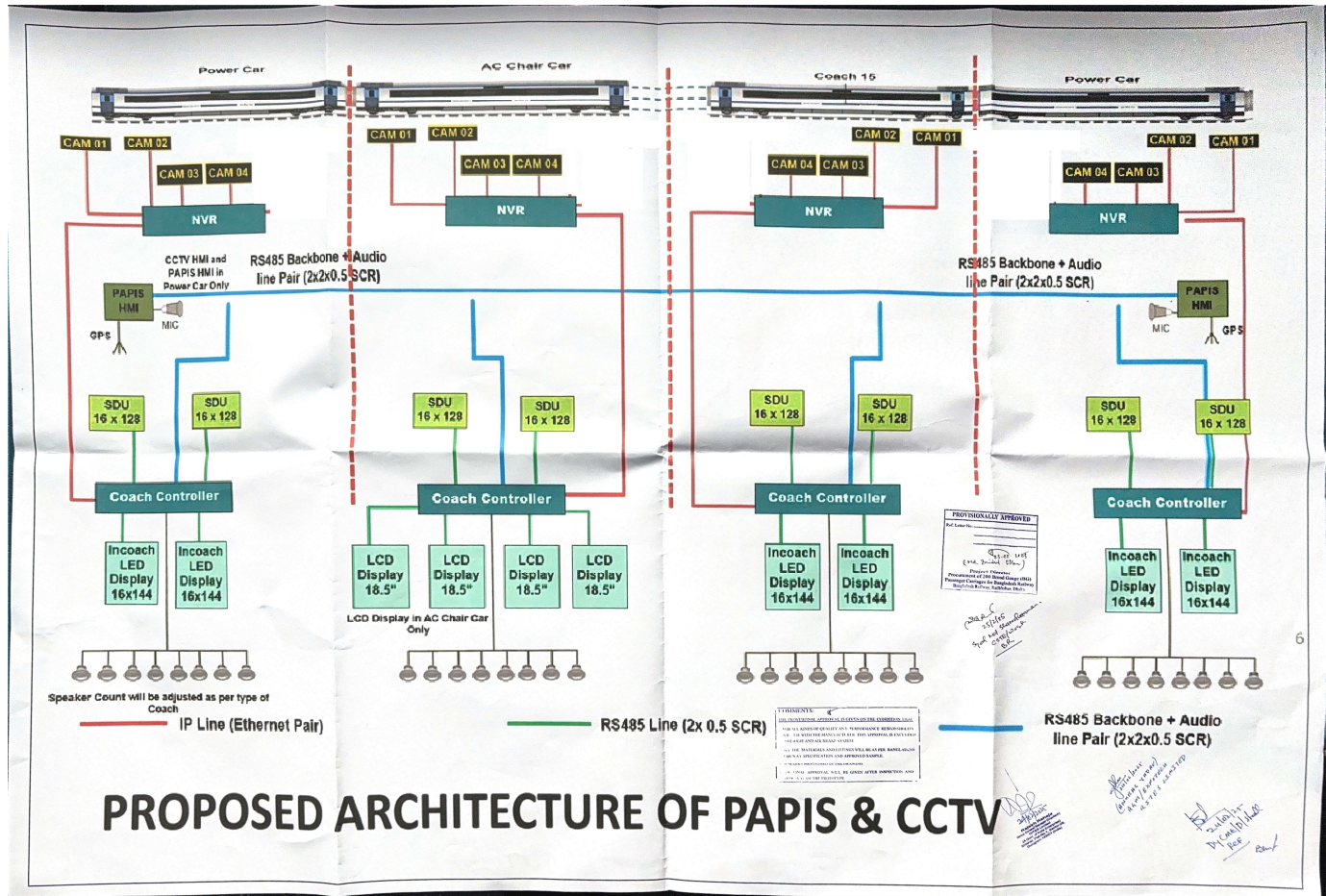


1.5 Manual announcement will be played through MIC, if MIC icon is selected.





**Proposed Architect:-**



**Note:** 4 no. of Cameras to be provided at suitable location in each coach except FAC coach . where 6 nos of cameras shall be provided.