GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

सत्यमेव जयते

DRAFT TECHNICAL SPECIFICATION

FOR

LED SIGNAGE SYSTEM

Draft Specification No. RDSO/PE/SPEC/PS/0086-2009 (Rev.' 0') , Amdt -2

Sl.No.	Amendment		Revision		Remarks
	No.	Date	No.	Date	
1.	'1'	11.11.2010	-	-	Clause nos. 9.11, 9.12, 11.0 (Warranty) & 15.0(STR) and Annexure III, IV & V Deleted as per Railway Board's letter No. 2006/Elect.(G)/150/9/Pt. dated 10.09.2010.
2.	2	-			-

Approved by

Executive Director (EM)

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CHAPTER -1

1.0 Foreword:

IR plans to introduce LED Signage System on various places of railway stations and circulating area to provide easily understandable and visible information about station name, safety boards, general and emergency instructions, information board, reservation chart and time table etc. for passengers.

2.0 Scope :

The specification of LED Signage System for Railway Platform and circulating area covers General & Technical requirements, method of sampling, Inspection & tests, warranty etc.

3.0 Scope of Supply:

The scope of supply will include the following items.

a) LED signage system as described in chapter 2,3 & 4.

b) SMPS Based power supply to work directly on 80V -260V AC with short circuit protection with properly rated fuse at its input.

c) Mounting arrangement for all the above equipments

4.0 Standards used

Manufacturer should have the following standards and follow in compliance of this specification:

S. N.	Standard	Description
1	IEC 60068-2-82	Environmental testing of electronic component
2	IEC 61000	EMI /EMC compatibility
3	IEC 60529.	Test for enclosure protection
4	ELRS/SPEC/SI/0 015-2001	Specification for Reliability of Electronics used in Rolling Stock Application

5.0 Operating Conditions:

The equipment shall be sturdy and suitable for the following service conditions normally to be met in service:

5.1	Ambient Temperature	–5°C to +55°C
5.2	Humidity	Relative humidity : 40% to 100%
5.3	Altitude	Max 1200 meters above sea level, (1800metres for J&K area)
5.4	Atmosphere	Extremely dusty and desert weather and desert terrain in certain areas. The dust contents in air may reach as high values as 1.6 mg/m^3. During dry weather, the atmosphere is likely to be full of dirt & dust. The rainfall is fairly heavy.
5.5	Coastal area	The equipment shall be designed to work in corrosive atmosphere. stations in coastal areas having continued exposure to salt laden air .Airborne contaminants like smoke and chemical vapors. Conducting particles like metal clips and filings. Max. pH value : 8.5 Sulphate : 7 mg/liters Max. Concentration of : 6 mg/liters Chlorine Max. Conductivity : 130micro siemens/cm

6 .0 Specification of LED:

Clear Amber/Green/Red/Blue color LEDs (Light Emitting Diodes) with specified parameters as per latest datasheet of Original Equipment Manufacturer. Only NICHIA /PHILIPS/ LUMILIDE/AVAGO/Seol semiconductor/OSRAM make LED with L70 life of minimum 50,000 hours shall be used. LED manufacturer shall submit following test results as per relevant specification:-

(i) Resistance to soldering heat
(ii) Solder ability
(iii) Thermal setting

(iv) Temperature cycle
(v) Moisture resistance cycle
(vi) Terminal strength bending test
(vii) Terminal strength Pull test.

6.1 Specification of LED for Edge Lit signage:

Amber/Green/Red/blue color 5 mm LEDs (8 mm pitch) of uniform intensity and Luminosity for excellent Visibility shall be used. The intensity of the illumination is such that it shall be possible to read the information clearly from a distance of 20 meters or higher. This visibility is to be checked and ensured for that part / spot of indicator which has maximum intensity of ambient light.

6.2 Specification of LED for variable cum fixed signage:

Amber color 5 mm oval LED(with 8 mm pitch) shall be used for variable portion and 5 mm cool white LED shall be used in backlite fixed portion of signage. LEDs of uniform intensity are used for longer visibility for display boards in open area where minimum visibility requirement is 50 meters.

6.3 Specification of LED for Back lit Signage:

Clear cool white color 5.00 mm LEDs of uniform intensity and Luminosity shall be used for excellent Visibility. The intensity of the illumination is such that it shall be possible to read the information clearly from a distance of 20 meters or higher.

7.0 Power Supply:

7.1 All power supply units supplied are Switch Mode Power Supply type (SMPS) operated from AC source ranging from 80V to 270 Volts, 50 Hz AC, single phase.

7.2 All the power units are tested at 50% load of maximum working capacity.

7.3 Battery backup of least 6 hours, wherever required, shall be provided for each display panel and shall form and integral part of the panel. Battery charging system is based on current controlled multi-stage MOSFET based. VRLA Battery of reputed make (such as Exide, TAFE, Amar Raja, etc.) shall only be used.

7.4 Cables provided for each of the display boards shall be XLPE type and shall have sufficient cross sectional area to withstand power load of the display board.

7.5 Protection against transient coming in the power supply source or generated by some other source is provided. Protection against voltage fluctuations of short durations is also provided. All fuses used are reset baled.

7.6 Over voltage and short circuit protection is incorporated within the power supply.

8.0 General Requirements:

8.1 The Unit shall be suitable for mounting in various places of Indian Railway and circulating area space and shall be specially designed to provide metallic enclosures for protection against ingress of dusty atmosphere specified in this specification .

8.2 The enclosure shall be fabricated from CRCA sheet of 0.8 mm thickness. Processes like machining, bending, spot welding etc., shall be adopted to ensure geometry of the enclosure and the aesthetic look. The enclosure shall be given two coats of primer paint and shall be finished by black enamel paint or powder coated.

8.3 The hardware shall conform to IS 2389-1968 "Specification for precision hexagonal heads bolts, screws, nuts and lock nuts. All mild steel hardware shall be cadmium plated and passivated to IS 1572-68 "Specification for electroplated coatings of cadmium on iron and steel". To the extent practicable the screws shall work on tapped hole (i.e.) provision of loose nuts to be avoided. The screw heads shall be preferably accessible from the front. The depth of the tapped hole shall be more than the diameter of the screw. Wherever necessary, screwing pieces shall be spot welded to obtain required thickness.

8.4 The name/identification plates shall be of bright anodized aluminum with black letters embossed or etched on white background. These plates shall be fitted by riveting. The nameplate shall indicate the month and year of supply in addition to the usual information.

8.5 The unit should be compact, robust and light in weight.

8.6 Electronic components used in electronic controller or elsewhere shall be as under:-

(i) IC (Integrated Circuits) shall be of Industrial.
(ii) Electrolytic capacitors shall be rated for max. temperature of 105 deg C.

(iii) Paper/polyester capacitors shall be rated for max. temperature of 85 deg C.

(iv) The resistance shall be preferably made of metal film of adequate rating.

(v) Switching devices such as transistors, MOSFETs and IGBTs shall have junction temperature 150 deg C.

(vi) Devices shall have the adequate thermal margin at the ambient of 55 deg C.

8.7 The unit shall have protection against open circuit and short circuit of the cable and circuits used. The design shall ensure interchangeability of signage board of a particular make.

8.8 The cable between the display boards and power supply shall form part of the supply. Exact lengths required shall be specified by the purchaser at the time of tendering.

8.9 The unit shall meet the requirement of RDSO Specification of 'Reliability of Electronic Components' used in rolling stock No. ELPS/SPEC/ Reliability/ 0015

8.10 The rating to loading ratio of various active/passive components to the worst working conditions shall be more than two. The manufacturer shall submit the rating versus loading chart for the various components used corresponding to the loading at the worst working conditions.

8.11 It will be preferable to have the entire microprocessor based hardware, RAM, EPROM, Input/output ports and opto isolation etc. so optimized that the component count is kept low without sacrificing the overall system performance and reliability. Necessary interfacing of the hardware and the connectors will be provided on the cards.

8.12 All the cards should be suitably protected and mounted in a robust metallic housing so that entire assembly is capable of withstanding shocks, vibrations, electromagnetic induction and electrical surges etc**.** Electromagnetic compact-ability of the entire system shall comply with provisions of IEC 61000. The equipment should withstand surge & spikes as specified in IEC 60571-1.

8.13 All electronic components and ICs used shall be selected after proper burn in and screening tests as per RDSO specification No. ELRS/SPEC/SI/0015 with latest amendment and shall be adequately rated to withstand the service requirements. The manufacturer for approval of RDSO should submit a quality assurance scheme.

8.14 The signage unit shall be supplied with clamps to avoid the

possibility of swinging with wind etc.

8.15 Material for the printed circuit board shall be copper clad glass epoxy of grade FR-4 or equivalent. The thickness for PCBs should be minimum 1.6 mm.

8.16 Assembled and tested printed boards have given a conformal coating to enable them for functioning under adverse environmental conditions. The coating material should be properly chosen to protect the assembly from the following hazards.

Humidity; Dust and dirt; Airborne contaminants like smoke and chemical vapors; Conducting particles like metal clips and filings; Accidental short circuit by dropped tools, fasteners etc.; Abrasion damage and Vibration and shock (to a certain extent)

8.17 Following description shall be etched on the component side of the PCB:

Component outline in the proximity of the component; Manufacturer's name; PCB name; Part number.

8.18 Following description shall be engraved on the PCB:

The manufacturing serial number, Month and year of manufacture.

8.19 Suitable rating of Power cable with standard color coding should be used.

The software used shall comply to conditions specified in RDSO specification No. ELRS/SPEC/SI/0015 with latest amendment.

9.0 Contractor's Responsibility:

The contractor's responsibility will extend to the following:

9.1 The manufacturer shall supply detailed instructions for proper installation of the equipment on platforms. For this purpose, the manufacturer shall depute his engineers/supervisors to purchaser site during installation of the equipment at the platform.

9.2 The manufacturer shall be responsible for commissioning, testing and field trials of the equipment in service and depute team of engineers/supervisors for this purpose during developmental stage.

9.3 The manufacturer shall arrange required instrumentation and carry out detailed tests and field trials jointly with RDSO.

9.4 The manufacturer will also offer special tools and instruments separately which may be required for maintenance. A separate quotation will be issued for the same.

9.5 The manufacturer shall recommend list of spares required for satisfactory maintenance and operation of LED based display signage for a period of five years and quote the prices for them separately.

9.6 The manufacturer will submit detailed design manual for the system containing following details: -

(a) Hardware: Following information will be provided by the supplier.

- The detail functioning of each card.
- Testing procedure of each card.
- Circuit diagram & PCB layout.
- Write up on the working of LED signage board.

(b) Software:

- Setup files of computer software on a CD.
- Control flow chart and algorithm for the control logic.
- Operating manual of the software.
- External facility to modify the display program through handheld unit/PC.
- External facility to change parameters, if required in future, through handheld terminal unit/PC.

9.7 The manufacturer will arrange for training of Indian Railway personnel as per clause 12.0.

9.8 The manufacturer will supply the user's manual for maintenance and trouble shooting.

9.9 The manufacturer shall be responsible for carrying out improvements and modifications at his own expense on all the equipments supplied, provided such modifications/ improvements are decided to be necessary for meeting the requirements of reliability, performance and safety etc, jointly between manufacturer and purchaser.

9.10 For the purpose of technical decisions on improvements/ modifications etc. on equipment, the final authority from the purchaser's side will be RDSO.

9.11 Consumable materials, electrical energy for testing and commissioning of the system will be provided by the purchaser free of cost. - **Deleted.**

9.12 Test Equipment: **Deleted.**

10.0 Inspection and Testing:

10.1 Separate type, routine and acceptance for signage units will be conducted. Type test will be conducted by RDSO on one unit to verify that product meets the design and performance requirement of the specification. Some or all type test may be repeated after a period of three years to confirm the quality of the product to meet the specified requirement.

In addition the manufacturer shall also repeat the type test to be witnessed by RDSO either totally or in part in following cases without any additional cost.

- Modification of equipment likely to affect its function.
- Failure or variations established during type test.
- Resumption of production after an interruption of more than two years.

The routine tests are to be carried out by manufacturer on each unit to verify that properties of the product corresponding to those measured during type test.

10.2 Tests

The following tests shall be carried out.

10.2.1 Type Test:

For type test, one complete system consisting of all type of display boards shall be subjected to following tests as applicable:

(i) Visual Test
(ii) Performance test
(iii) Dielectric Test
(iv) Insulation Resistance test Insulation Test
(v) Endurance test
(vi) Testing of LED board casing for IP 65 to be certified by NABL accredited laboratory as per IEC 60529.
(vii) Following tests to be done on whole electronic unit i.e. controller, power supply etc as per IEC 60571

a) Dry heat test Temperature rise test (Dry heat run test): The tests shall be carried out as per IEC 60571- on the complete electronic assembly in closed condition as during normal operation, on full load, placed in test

chamber where temperature is progressively raised from ambient from 70 °C. as per IEC 60571. At the end of this test the performance test is repeated

b) The temperature rise test (Damp heat test) to be conducted as per IEC-60571

c) Voltage surge test Protection against surges and voltage spikes: Adequate provisions will be made in the design for suppression of internal transients, spikes and to withstand external transients, spikes and surges as per limits laid down in IEC-60571 latest.

d) EMI/EMC test as per IEC 61000.

e) Vibration and Shunting Shock test: Vibration and shock test to be conducted as per IEC – 60571

f) Chromaticity and dispersion angle test as per BS 13760

g) Checking of document of purchase of LEDs and battery used.

Only one complete system shall be tested for this purpose. 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 purchaser or his nominee at his discretion, may call for another 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 shall be used put under field trial for at least 180 days.

10.2.2 Acceptance Test:

Acceptance test shall be carried out on 20% of the lot offered (Minimum 2 of each lot).

i) Visual test
ii) Performance test
iii) Reverse Polarity test
iv) Insulation Resistance test
v) Dielectric test

10.2.3 Routine Test

i) Visual
ii) Performance test
iii) Reverse Polarity test
iv) Insulation Resistance test
v) Dielectric test

10.3 Conditions of Tests

10.3.1 Unless otherwise specified all tests shall be carried out at ambient atmospheric conditions.

10.3.2 Inspection and testing shall be carried out to the effect that all requirements of this specification are complied with.

10.3.3 Inspection shall be carried out for various types of display boards, Hand-held programming devices and software. PC for Control Console Unit, UPS etc. shall be checked during inspection for their functional performance required proper working of complete system as per specification.

10.4 Visual Inspection:

The unit should be checked visually for Dimensional check, Constructional details. General track layout. Quality of soldering and component mounting Conformal Coating. Legend printing. Green masking. Indications and displays Mounting and clamping of connectors. Proper housing of cards. and General workmanship. The general workmanship should be good with all the component properly secured and sharp edges rounded off. The unit shall be checked for proper manufacturing, proper fitment in its enclosure, connection and dimensions as agreed between manufacturer and purchaser. Each equipment of the system shall be visually inspected to ensure compliance with the requirement of this specification. Checking of bill of material of test sample / design document shall be done.

10.5 Performance Test

All the control functions of the unit will be checked and the unit will allowed to work for 24 hours. The unit will be tested with all accessories supplied by the manufacturer for all functions given in the specification by simulating the other conditions in laboratory at rated voltage. Similarly during acceptance test also the functions of the unit will be tested along with accessories supplied by the firm by simulating other conditions in a laboratory.

10.6 Insulation Resistance Test

The insulation resistance of the" unit between earth and current carrying parts shorted together shall be more than 20 Mega ohms at a ambient temperature of 55 °C measured with 500 V Insulation Tester (megger).

10.7 Dielectric Test :

The Dielectric test shall be conducted as per the relevant clause of IEC 60571(latest) for supply voltage range between 72 V and 125 V with rms value of test voltage as 1000 V.

10.8 Endurance Test:

Endurance test shall be conducted on one of the modules for continuous operation which shall be 30 days burning for LED without giving any deterioration in light output. unit shall be tested with a cycle of 10,000 operations of 2 minute "'on" and 1 minute "off".

Prototype will be inspected and tested by the Engineers of RDSO at the works of the manufacturer and they will also be involved in testing of the units on the various places of Indian Railway and circulating area till the development is successfully completed.

After successful prototype testing and commissioning of unit on various places of Indian Railway and circulating area it will put under extensive field trials for six month.

The manufacturer shall furnish results of all the tests and inspection carried out internally and in the presence of Railways representative to RDSO.

Any defect noticed/design improvement found necessary as a result of these tests/trials shall be carried out by the manufacturer in the least possible time.

All the system to be supplied against the tender shall incorporate without any extra cost, all the modifications carried out in the first prototype after the field trials of this system.

11.0 WARRANTY: (Deleted)

12.0 TRAINING:

The manufacturer shall arrange for training to IR personnel in maintenance and trouble shooting of the system supplied. Ten man-days training will be provided in operation, maintenance & trouble shooting aspects will be provided. The manufacturer will provide detailed technical write-up to all the trainees. The syllabus for training will have to be approved by the purchaser. The venue of training will be mutually agreed.

Suitable training material will be supplied to the participants. Training will be arranged free of cost.

13.0 Marking & Packing:

13.1 The following information shall be clearly marked 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) Connection diagram of the equipment on the side of the cover.

13.2 The equipment and its sub assemblies shall be packed in thermo Cole boxes and the empty spaces shall be filled with suitable filling material. Before keeping in the thermo Cole box, the equipment shall be wrapped with bubble sheet. The equipment shall be finally packed in a wooden case of sufficient strength so that it can withstand bumps and jerks encountered in a road/rail journey.

14.0 INFRINGEMENT OF PATENT RIGHTS:

Indian Railway shall not be responsible for infringement of patent rights arising due to similarity in design, manufacturing process, components used in design, development and manufacturing equipment and any other factor, which may cause such dispute. The responsibility to settle any issue lies with the manufacturer.

15.0 Schedule of Technical Requirement for manufacturer of LED Signage system: (Deleted)

16.0 ENCLOSURE:

(I) **ANNEXURE –I**
MECHANICAL DRAWINGS AND SPECIFICATIONS OF EDGE LIT SIGNAGE HOUSING
(II) **ANNEXURE – II**
IMAGES OF VARIABLE CUM FIXED MESSAGE SIGNAGE
(III) **ANNEXURE – III**
ESSENTIAL MACHINERY & PLANTS REQUIRED FOR PRODUCTION & DESIGNING
(IV) **ANNEXURE-IV**

ESSENTIAL TESTING EQUIPMENTS REQUIRED FOR QUALITY ASSURANCE

(V) **ANNEXURE –V**
FORMAT FOR QUALITY ASSURANCE PLAN

CHAPTER -2

EDGE LIT SIGNAGE

1.0 Scope of Supply

The Edge lit signage system shall include the following items.

a) Signage housing
b) Edge lit LED strip with control circuit
c) Fixed message Acrylic etched sheet.
d) Power supply with battery backup of at least 6 hours.

2.0 Description of Edge Lit Signage:

2.1 The information on fixed acrylic sheet can be in English, Hindi and in the regional language along with the symbols and images.

2.2 Every signage LED housing is made from CRCA 0.8 mm thick black powder coated sheet.

2.3 LEDs with equal fringe and uniform intensity are used to ensure that the information to be edge lit has excellent contrast.

2.4 All messages are displayed on Acrylic sheets of 8.00 mm thickness .Also, the mechanical housing for these sheets are such that easy replacement of them are possible in case of repair/replacement/modification.

2.5 All Signage are modular, such that any module (i.e. Acrylic sheet, LED strip, connector, cable, housing, power supply unit etc.) can be easily removed when defective and a fresh module is fixed to make the system functional again.

2.6 Information can be displayed on single side or both side as per requirement

2.7 A sample of such signage having "EXIT" information is at annexure -I

3.0 Technical Specification:

3.1 General Specification

No. of Sides	Single side/double side.
No of LEDs	18 Nos per PCB module
Spacing between LEDs	21 mm
Fonts :	Hindi/English/ regional language
Physical Dimensions for acrylic sheet	As per message requirement
Frame type:	CRCA sheet(black powder coated)
Character size	55 mm/60mm (Variable and as per the requirement).
Information	As per requirement in two/three language.
Acrylic sheet thickness	8.00 mm
Reflecting sheet thickness	2.00 mm
Case width	36.5 mm
Mounting Provision	Wall Mounting / Hanging With Clamps

3.2 Electrical Specification

System Wattage max per single side board	3.6 W
Led wattage	0.06W per LED
Led power control	Current regulator
Nominal Voltage:	230 V AC
Operating Voltage Range	150 V -260 V A.C
Current	40 mA max with SMPS regulator
Luminosity:	500mcd
Dispersion angle	Solid angle 40 Degree

CHAPTER 3
VARIABLE CUM FIXED SIGNAGE

1.0 Scope of Supply

The Variable cum fixed signage system shall include the following items.

a) A variable message portion typically 16x96 dot matrix LED signage comprising 16/8 bit microprocessor system having necessary Non-volatile Memory, RAM, decoders etc for LED display Signage board with LED of reputed make.

b) Fixed message portion made from LED based Back Lit or Edge Lit signage to display the graphics/Logo/symbols on Acrylic etched sheet or digitally printed Vinyl sheets. The signage sheets should have the capability of being changed if required with new sheets with same or different message.

c) Complete software for operation of the system in windows environment.

d) Power supply of battery backup with 6 hours.

2.0 Description of Variable cum fixed Signage System:

2.1 Backlit portion shall be illuminated by suitable no of LEDs as described in chapter 4 of this specification.

2.2 The information on fixed acrylic sheet of 8.00 mm thickness can be in English, Hindi and in the regional language along with the symbols and images.

2.3 Every signage LED housing is made from CRCA sheet of thickness 0.8 mm. There shall be powder coating of thickness of minimum 60 microns.

2.4 LEDs with equal fringe and uniform intensity are used to ensure that the information to be variable cum fixed signage has excellent contrast.

2.5 The information on variable display boards shall be displayed in turn in English, Hindi and in the regional language as specified. Each display shall last for specific period of up to 60 seconds and shall be adjustable by programming the displays accordingly.

2.6 variable portion of board shall be covered with a transparent layer of UV stabilized Polycarbonate sheet of minimum thickness 3mm or laminated glass sheet of minimum thickness 6 mm in order to give good visibility with protection against dust and vandalism.

2.7 These variable message part of display boards shall be constructed using PCB module of 16X32 matrix. The mechanical mounting of these modules shall be such that easy replacement of module PCB is possible in case of repair. Such replacement shall not call for removing any other PCBs.

2.8 The construction of the whole unit of different type display boards should be modular, such that any module (i.e. PCB, connector, cable, power supply unit etc.) can be easily removed when defective and a fresh module is fixed to make the system functional again. Wiring between different modules should be done with the help of male/female type of connectors. There should not be any requirement of rewiring, re-soldering/de-soldering or opening and reconnections of wiring etc. during the maintenance, unless there is damage to the wiring.

2.9 There should be no changes required in the electronics of the unit's control circuitry for adding extra PCB modules to the variable message part of display boards in addition to the numbers mentioned in the specifications.

2.10 Information can be displayed on single side or both side as per requirement.

2.11 A sample of such signage having "COLD WATER " information is at annexure - II

3.0 Technical Specification:

Single side variable cum fixed Signage board has following specifications:

3.1 General Specification

Matrix	In multiple of 16 X 32 Modules
No. Of Lines per Board	As per requirement
No. Of Sides	Single Face or Double Face (as specified). In case of double sided boards, both faces shall display the same data.
Pitch of LED	8.00 mm
Fonts / Languages Displayed	English, Hindi & Regional language
Character size	Variable and as per the requirement.
Information to be displayed	As per requirement in two/three language.
Type of CPU	8 or 16 bit and above
Physical dimensions	45"x14"x4" or as per requirement for complete board 30"x5" or as per requirement LED variable display 11"x5" or as per requirement for fixed signage
Case Material	CRCA sheet of 0.8 mm thickness
Protection	IP 65
Frame type	Mild steel

3.2 Electrical Specifications

LED System Wattage	18 W max (with Edge lit fixed signage) and 20 W max(with Back lit fixed signage)
Nominal Voltage:	230 V AC
LED control	Current regulator
Operating Voltage Range	150 V -260 V A.C with SMPS power supply
Luminosity	700mcd
Viewing angle	70 deg

CHAPTER 4

BACK LIT SIGNAGE

1.0 Scope of Supply

`The Back lit signage system shall include the following items.

a) Display board with CRCA housing

b) 295 mm x 295 mm LED modules with LED's arranged in suitable matrix

c) Power supply with 6 hrs Battery backup arrangement.

2.0 Description of Backlit Signage system :

2.1 System Description :

2.1.1 Backlit signage system shall comprise of a front acrylic sheet having message, a LED board having LEDs connected in suitable matrix and a support plate at back .

2.1.2 The LED backlit system is supplied with mounting arrangements frame for easy mounting/installation etc.

2.1.3 Module connectors for connecting the LED modules.

2.1.4 The information on front sheet can be in English, Hindi and in the regional language or can be picture, symbols and images.

2.1.5 All housing and the mounting arrangements shall be provided by manufacturer at time of installation .

2.1.6 LEDs with equal fringe and uniform intensity are used to ensure that the information to be back lit has excellent contrast and uniform ness.

2.1.7 All System units should be modular, such that any module (i.e. LED board, LED modules, connector, cable, housing, power supply unit etc.) can be easily removed when defective and a fresh module is fixed to make the system functional again.

3.0 Technical Specification :

Single side variable cum fixed Signage board has following specifications:

3.1 General Specification

No. of Lines per Board	As per requirement
Case Material	CRCA sheet of 0.8mm thickness
Front Acrylic sheet thickness	3 mm
Protection	IP 65
Mounting Provision	Wall Mounting / Hanging With Clamps
Dimensions of LED module	295 mm x 295 mm

3.2 Electrical Specifications

Nominal Voltage:	230 V AC
Operating Voltage Range	150 V -260 V A.C with SMPS power supply
LED type	5mm
LED System Wattage	6 W max per square feet
LED Wattage	0.06 W per LED
LED control	Current regulator
Luminosity	700mcd
LED Color	Cool White
Viewing angle	70 deg
Solid angle	40 Deg
Distance between LEDs	1.5" diagonally
No of LEDs in each module	72
LUX level inside the surface	1700 LUX @ 2" +/- 10%
Color temperature	5500K/6500K

Annexure -I

Dimension of Acrylic sheet and character size for sample of Edge lit Signage

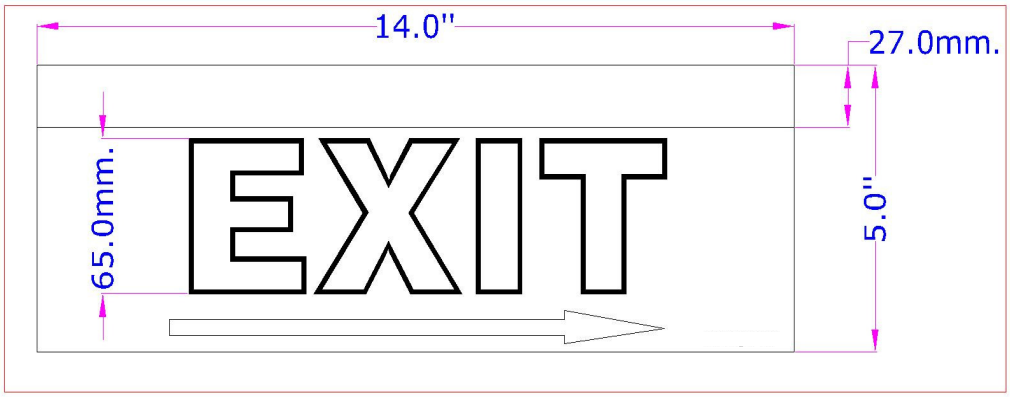

FIGURE 1: Text in English only

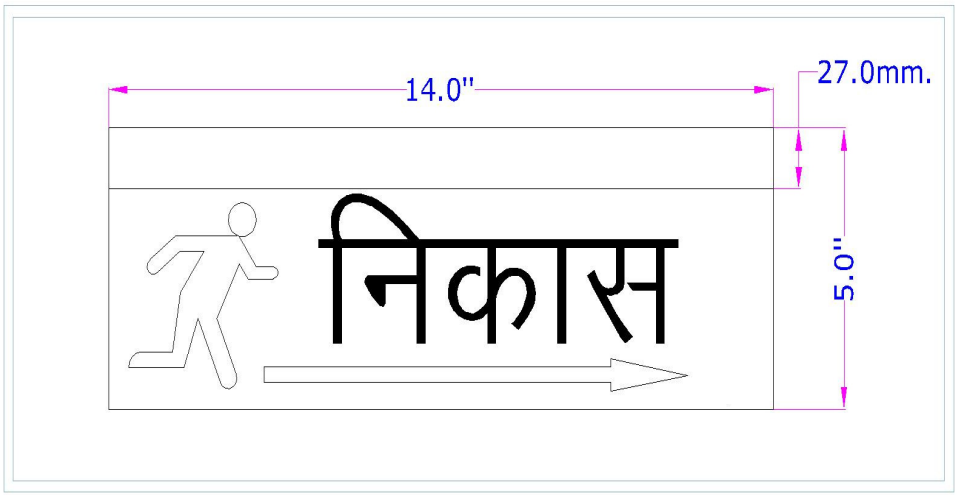

Figure 2: Text in Hindi and Symbols

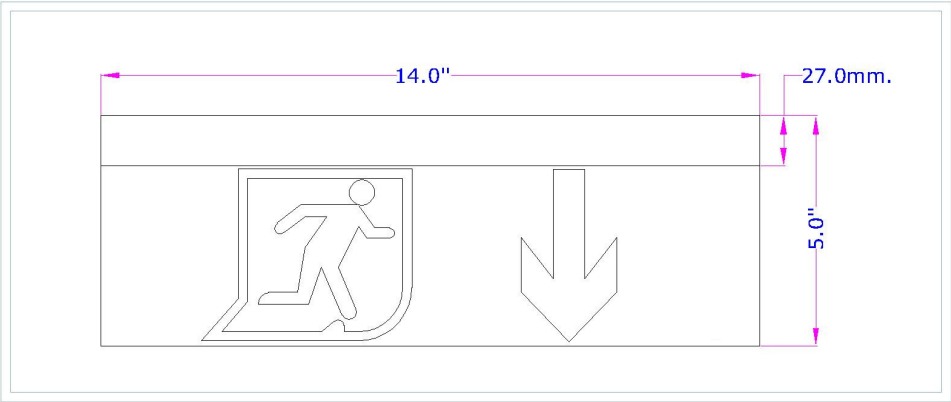

Figure3 : Image depicting the symbols

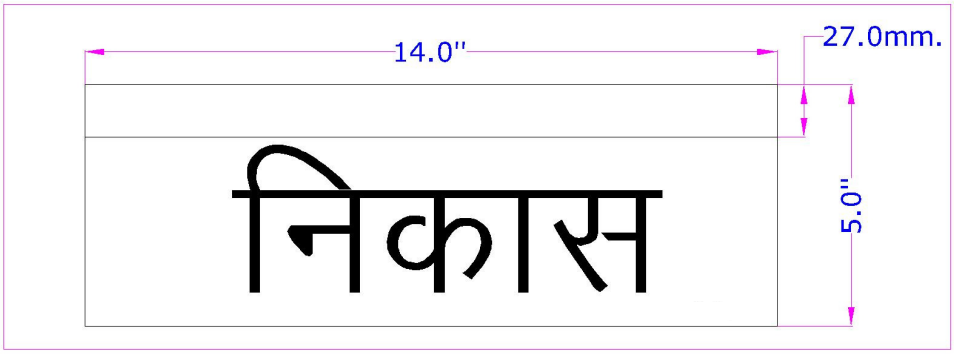

Figure 4: Text in Hindi Only

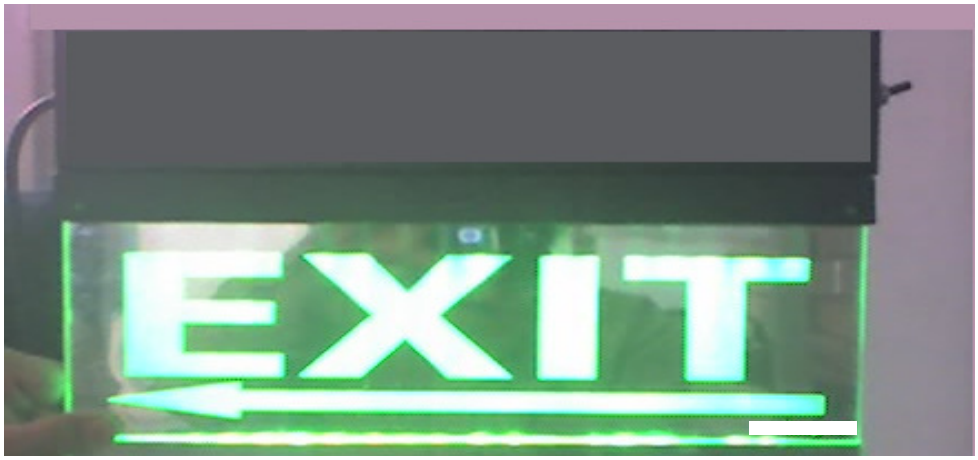

Figure 5: Picture of final product

Annexure - II

Image and ACP body for Variable cum Fixed message signage system

FIGURE 1: Images of Variable cum Fixed message signage system

FIGURE 2: ACP body for extended durability finish for Variable cum Fixed message signage system

ANNEXURE – III

ESSENTIAL MACHINERY & PLANTS REQUIRED FOR PRODUCTION & DESIGNING (DELETED)

ANNEXURE-IV

ESSENTIAL TESTING EQUIPMENTS REQUIRED FOR QUALITY ASSURANCE (DELETED)

ANNEXURE –V

FORMAT FOR QUALITY ASSURANCE PLAN (DELETED)