

- e) The LEDs used shall have white point stability less than 5 step (Macadam ellipse) or as per LM80. The manufacturer shall submit the compliance from OEM.
- f) The LEDs shall be LM80 certified for white LED along with TM21 projection for more than 50000 hours.
- g) The LEDs used shall be UL certified with UL number.
- h) The LED driving current shall not be more than 80% of absolute maximum forward current.
- i) The LED beam/view angle (typical) shall be 120° or more.

## 6.0 TECHNICAL REQUIREMENTS

6.1 The luminaire casing/housing shall be made as per the requirement in Clause 5.0(a).

6.2 The electronic components used shall be as follows:-

- a) All the electronic components used in the circuit shall be of industrial grade or above.
- b) Metallic film/Paper/Polyester Capacitor shall be rated for 105°C or above.
- d) The resistors shall be preferably made of metal film/chip resistor of adequate rating. The actual loading versus rating shall be 3.
- e) The junction temperature of the Switching devices such as transistors and MOSFETs etc. shall not exceed 125°C (allowing thermal margin of 25°C).
- g) The protective cum adhesive coating (fire retardant) used on PCBs shall be clear and transparent and shall not affect color code of electronic components or the product code of the company.
- h) The heavy components shall be properly fixed. The solder connection should be with good finish.
- i) The electronic circuits, PCB and components shall meet the requirement of RDSO Specification No. ELRS/SPEC/S1/0015-OCT, 2001 (Rev.0) for electronics used in Rolling Stock Application. The electronics covered for this equipment shall pass all the tests called for in the specification. The manufacturer shall indicate the deviation or compliance.
- j) The infrastructure for Quality Assurance facilities as called for in the specification shall be available with the manufacture for this product.

6.3 Low smoke, halogen free, fire retardant thin walled flexible e-beam/PTFE cable with multi-strand copper conductors suitable for continuous operation at 120°C shall be used inside the luminaire as connecting wires and fuse protection shall be provided at input side.

6.4 Adequate heat sink with proper thermal management shall be provided. Design should not consider heat dissipation through roof top as roof is provided with heat insulation material.

6.5 Care shall be taken in the design that there is no stagnation of water anywhere in the luminaire as well as driver. The entire housing shall be dust proof and water spray having IP-65 protection as per IEC 60529.

Prepared by

  
JE/PE

Checked by

  
05.7.2016  
Director / PE & Battery

- 6.6 The unit shall be maintenance free.
- 6.7 Temperature of diffuser's surface shall be lower than the fluorescent/compact fluorescent luminaire being used presently.
- 6.8 The control gear shall be designed in such a way that temperature of heat sink shall not be more than 45°C for air-conditioned coaches and 10°C above the ambient for non-air-conditioned coaches.
- 6.9 Diffusers used shall be such that the glare from individual LED is restricted and shall appear as a single source of light as in the case for lighted globe and it shall not cause inconvenience to the passengers.
- 6.10 The illumination of the luminaire provided in the coach shall not have multiple shadows under one Luminaire.
- 6.11 All the material used in the luminaire shall be halogen free and fire retardant conforming to UL94-V0.
- 6.12 **Illumination Level:** The fitting shall be so designed that the illumination level shall be evenly distributed and shall be free from glare. Illumination level of different types of luminaire shall be as given below:

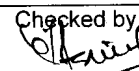
Sl. No.	Type of Luminaire	Vertical Distance (Mtrs) from the floor level	Average Illumination Level ( Lux)	Colour of illumination
1.	Type –A	0.84	120	Cool day white
2.	Type –B1 & B2	0.84	80	Cool day white
3.	Type –C	0.84	80	Cool day white
4.	Type –D	0.50	100	Cool day white
5.	Type –E	10.0*	Clear visible	Blue
6.	Type – F1/F2/F3/F4/F5	0.75	100	Cool day white
7.	Type –G	10.0*	Clear visible	Cool day white
8.	Type –H1/H2	10.0*	Clear visible	Green - Vacant Red – Occupied
9.	Type –I	400*	Clear visible	Red
10.	Type –J	0.84	80	Cool day white
11.	Type –K	0.84	80	Cool day white
12.	Type –L	0.84	120	Cool day white
13.	Type –M	0.84	80	Cool day white
14.	Type –N	0.84	80	Cool day white
15.	Type –O	0.84	120	Cool day white
16.	Type –P	-	-	-
17.	Type –Q1/Q2	1.20	100	Cool day white
18.	Type-R	0.84	120	Cool day white
19.	Type-S	0.84	120	Cool day white
20.	Type-T	0.84	120	Cool day white

\* Horizontal distances

Prepared by

  
JE/PE

Checked by

  
05.7.2016  
Director / PE & Battery

Note:

1. Variation in illumination level shall be  $\pm 2\%$  for input voltage range from 90V to 140 V AC/DC (for TL&AC coaches, 3 phase EMU, DEMU & Kolkata Metro coaches) and 90 V AC to 170 V AC (For Conventional EMU / MEMU coaches).
2. The illumination shall not have infra-red and ultra-violet emission. The test certificate from the NABL approved laboratory shall be submitted.

**6.13** After 50,000 burning hours, the luminaire intensity shall be at least 70% with degree of uniformity of at least 1:1.3 as per UIC 555. Data sheet showing year wise deterioration in the LED shall also be submitted along with design.

**6.14** Detailed design shall be furnished before manufacturing of prototype. However, information as per Annexure-2 shall be submitted by the manufacturers along with in-house test results while offering for witnessing the prototype testing at firm's premises.

## **7.0 TESTS:**

Tests are classified as:—

- Prototype test
- Type test
- Acceptance test
- Routine test.

### **7.1 Prototype Test**

Prototype test is conducted on the first unit developed by the firm as per the relevant specification.

### **7.2 Type Test**

Type tests shall be carried out to prove confirmation with the requirement of specification and general quality/design features of the unit. The results of the type tests shall be valid for a maximum period of 3 years. In case of any change in Bill of Material (BOM) or design of unit, complete type test shall be repeated.

If any sample fails in any of the type tests, two fresh samples shall be taken and tested. If any sample again fails in that test, the whole lot shall be rejected.

### **7.3 Acceptance Tests:**

These tests are carried out by an inspecting authority at the manufacturer's premises on sample taken from a lot for the purpose of acceptance of a lot. Acceptance tests shall not be carried out from particular luminaire from the lot on which type tests have already been conducted. Recommended sampling plan is given below.

#### **7.3.1 Sample size and criteria for conformity**

The luminaire shall be selected from the lot at random. In order to ensure randomness of selection, procedures given in IS 4905-1968 (Reaffirmed 2001) may be followed.

Prepared by  JE/PE	Checked by  05.7.2016 Director / PE & Battery
---	---

#### 7.4 Routine Tests:

These tests shall be performed by the manufacturer on each complete unit of the same type and the results shall be submitted to the inspecting agency, prior to offering the lot for acceptance test.

#### 7.5 Test Scheme:

Sl. No.	Description of test	Clause no.	Prototype Test	Type Test	Acceptance Test	Routine Test
1.	Visual and Dimensional check	8 (i)	Y	Y	Y	Y
2.	Checking of Purchase documents of LED	8 (ii)	Y	Y	Y	Y
3.	Resistance to humidity	8 (iii)	Y	Y	-	-
4.	Insulation resistance test	8 (iv)	Y	Y	Y	Y
5.	HV test	8 (v)	Y	Y	Y	Y
6.	Over voltage protection	8 (vi)	Y	Y	Y	Y
7.	Wattage measurement	8 (vii)	Y	Y	Y	-
8.	Short circuit protection	8 (viii)	Y	Y	-	-
9.	Surge protection	8 (ix)	Y	Y	-	-
10.	Reverse polarity	8 (x)	Y	Y	Y	Y
11.	Temperature rise Test	8 (xi)	Y	Y	-	-
12.	Ra (Colour Rendering Index) measurement test	8 (xii)	Y	Y	Y	Y
13.	Lux measurement	8 (xiii)	Y	Y	Y	Y
14.	Fire retardant Test	8 (xiv)	Y	Y		
15.	Test for IP65 protection	8 (xv)	Y	Y	-	-
16.	Vibration and Shock test	8 (xvi)	Y	-	-	-
17.	Environmental tests	8 (xvii)	Y	-	-	-
18.	Life test	8 (xviii)	Y	-	-	-
19.	EMI/EMC Test	8 (xix)	Y	-	-	-
20.	Endurance Test	8 (xx)	Y	Y	-	-
21.	Safety	8 (xxi)	Y	-	-	-

#### 8.0 Method of Testing

##### i) Visual and Dimensional Check:

The unit shall be checked visually for all dimensions as per approved design and drawing. General workmanship should be good; all the components properly secured and sharp edges shall be rounded off. Check the marking and quality of the workmanship visually. Check the rating and make of electronic/electrical items. Documents shall also be verified as mentioned in the specification.

##### ii) Checking of Purchase documents of LED

Document of purchase of LED lamps from the approved sources viz. NICHIA/OSRAM/SAMSUNG/LUMILEDS/CREE/AVAGO with bill of entry and certificate of conformance from manufacturer along with validation of driver controller card and luminaire by the manufacturer of the LEDs to ascertain the life of the LEDs shall be checked.

Prepared by  JE/PE	Checked by  05.7.2016 Director / PE & Battery
---	---

**iii) Resistance to humidity test**

This is carried out by suspending the painted panels in corrosion chamber maintained at 98% RH and temperature cycle of 42 to 48°C for 7 days and examining it for any sign of deterioration and corrosion of metal surface.

**iv) Insulation resistance test**

The insulation resistance of the unit between earth and current carrying parts shorted together shall not be less than 100MΩ at 60% RH when measured with 500V megger before and after HV test.

**v) HV test**

Immediately after insulation resistance test, an AC voltage of 1.72 KV rms (1500 + 2 x rated voltage) of sine wave form of 50 Hz shall be applied for one minute between the live parts and frame. There shall not be any kind of break down, flashover or tripping of supply.

**vi) Over voltage protection**

The Luminaire shall withstand at 250V DC/AC for two minutes.

**vii) Wattage measurement**

The wattage of luminaire shall be measured at 90V, 110V and at 140V DC. In case of luminaire for conventional EMU/MEMU, DEMU, it shall be measured at 90V, 110V, 140 V and 170V AC.

**viii) Short circuit protection**

The luminaire shall withstand Short circuit protection. The luminaire shall work normal after re-setting.

**ix) Surge protection**

It shall withstand a surge of 3kV ±5% as per the procedure given in IEC-60571 at the input terminals for all types of luminaire.

**x) Reverse polarity**

The Luminaire shall withstand polarity reversal. It shall be operated with reverse voltage for 5 minutes at maximum value of voltage range. At the end of this period, the supply shall be made in correct polarity and Luminaire shall operate in a normal way.

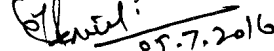
**xi) Temperature rise Test:**

Temperature rise Test shall be conducted at 90 V DC with full load. The temperature rise shall be recorded by temperature detectors mounted at the specified reference points on the body of semiconductors, capacitors and other components as agreed between purchaser and manufacturer. The maximum-recorded temperature under worst conditions shall be corrected to 55°C and compared with maximum permissible

Prepared by


  
JE/PE

Checked by


  
05.7.2016

Director / PE &amp; Battery

temperature (for power devices at junction). The thermal margin available shall be compared with the safety margin declared by the manufacturer. Under loading conditions as specified above, the corrected temperature of the power devices shall have a safety margin of minimum  $10^{\circ}\text{C}$ .

Temperature at junction shall not exceed  $125^{\circ}\text{C}$  when corrected to  $55^{\circ}\text{C}$ . The Luminaire shall also be subjected for short time rating after continuous loading to ensure the temperature rise within the permissible limit. The maximum temperature rise of the electronic devices on the PCBs shall not be more than  $20^{\circ}\text{C}$ .

**xii) Ra (Colour Rendering Index) measurement test**

The lumen is the unit of luminous flux, which is equal to the flux emitted in a solid angle of one Steradian by a uniform point source of one candela.

The initial reading of the chromaticity co-ordinates x & y shall be within 5 SDCM (Standards Deviation for Colour matching) from the standardised rated value as per Annexure - D of IEC 60081. The Colour Rendering Index shall be minimum 80.

The initial reading of the general colour-rendering index (Ra) shall not be less than the rated value decreased by 3.

Certificate based on relevant standards to this measurement shall be obtained from the OEM.

**xiii) Lux measurement**

Lux measurement with the help of Lux meter shall be carried out at a distance as shown in clause no. 6.12 above. Value obtained shall not be less than the Lux specified in clause no. 6.12 of the specification.

**xiv) Fire retardant Test**

Fire Retardant test shall be conducted as per UL-94 V0 for the insulating material used in the luminaire.

**xv) Test for IP protection**

This test shall be conducted as per IEC 60529 except berth reading light.

**xvi) Vibration and Shock Test**

The complete unit cubicle together with its mounting arrangements (including shock-absorbing devices, if provided) shall be subjected to the vibration and shock testing (for Category-1, Class A) as per latest IEC 61373.

**xvii) Environmental tests**

- The Luminaire shall meet the following tests as prescribed in IEC – 60571:

- a) Dry heat test.
- b) Damp heat test
- c) Test in corrosive atmosphere

Prepared by

  
JE/PE

Checked by

  
05.7.2016  
Director / PE & Battery

d) Burn-in test on PCB controller card only as per RDSO specification no. ELRS/SPEC/S1/0015-OCT, 2001 (Rev.0) for 45 hours.

- In routine tests, 100% luminaires shall be kept 'ON' for 48 hours at  $50^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , electrical parameters before and after tests shall be recorded and shall be in range before and after dry heat test. All parameters shall remain in the limit.
- In acceptance tests, 5 luminaires shall be kept 'ON' for 2 hours at  $50^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and  $-10^{\circ}\text{C} \pm 3^{\circ}\text{C}$ . No luminaires shall fail in this test.

#### xviii) Life Test

- The lumen maintenance & life test shall be as per LM80/IS 16105 and TM-21 respectively.
- The lumen maintenance of the lamp shall not be less than 90% of the initial lumens after 6000 burning hours at condition of case temperature (or solder point temperature) of  $105^{\circ}\text{C}$  and ensure testing is done at minimum 80% of its absolute maximum forward current ( $I_f$ ). The initial lumens will be taken after 100 hours aging. Certificate from OEM of LED manufacturer shall be submitted.

#### xix) EMI/EMC Test

EMI/EMC tests shall be conducted on complete luminaire unit as per IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4 and IEC 61000-4-6.

#### xx) Endurance Test

The Luminaire shall be kept "ON" with input voltage of 140 V DC (for luminaires for voltage range of 90-140 V DC/AC) and at 170 V AC (for luminaires for voltage range of 90-170 V AC) for 200 hours. After this, the Luminaire is subjected to 20,000 cycles of "ON" and "OFF", each cycle consisting of 3 seconds "ON" and 10 seconds "OFF" period. Luminaire should pass this test. Then, the test is to be continued beyond 20,000 cycles up to one lakh cycles, followed by performance test.

#### xxi) Safety:

The complete Luminaire unit, LED and driver shall comply with the safety requirements as per IEC mentioned in clause no. 3.0 above.

### 9.0 MARKING:

9.1 The following information shall be distinctly and indelibly marked on the housing:

- Indian Railways Insignia
- Year of manufacture/Serial Number (MMYY/ABCD)
- Name of Manufacturer
- Rated watt and voltage (Input)
- Rated watt - Output

Prepared by  JE/PE	Checked by  05.7.2016 Director / PE & Battery
---	---

**9.2** The make, month and year of manufacture shall also be marked on driver and LED panel.

**9.3** The following information shall be distinctly and indelibly marked on the lamps for retrofitment:

- a) Indian Railways Insignia
- b) Year of manufacture/Serial Number
- c) Name of Manufacturer
- d) Rated watt and voltage

#### **10.0 ISO CERTIFICATION:**

Firm shall possess the ISO certification for design, development, manufacturing and supply of the complete Lighting Unit.

#### **11.0 GUARANTEE**

The complete Luminaire shall have replacement guarantee for satisfactory performance and manufacturing defects for a period of 60 months from the date of commissioning or 72 months from the date of supply whichever is earlier.

#### **12.0 APPROVAL**

**12.1** While seeking approval, the firm shall submit a sample to the Vendor approving authority along with test results, circuit diagrams and dimensional drawing of the Luminaire. The prototype testing shall be carried out at manufacturer's work.

**12.2** The manufacturer shall also submit details like make, type, reliability grade, rating and loading of various electronic components used in the circuit. The temperature rise of the various components under the most adverse conditions shall also be declared.

**12.3** Final approval for appearance in vendor directory is subject to field trials for a period of three months for performance/lumen measurement of the luminaire as compared to test results during prototype.

#### **12.4 WITHDRAWAL OF APPROVAL**

Approval granted to the manufacturer is liable to be withdrawn in the event of noticing any change at a later date in the design or change from the bill of material as approved earlier without seeking the prototype approving authority's approval or using components of inferior specification/quality compromising with the reliability.

#### **13.0 SCHEDULE OF TECHNICAL REQUIREMENTS:**

##### **13.1 General**

- a) The manufacturer shall have minimum three years' experience in design, manufacturing, installation and commissioning of different types of LED based luminaire.

Prepared by  JE/PE	Checked by  05.7.2016 Director / PE & Battery
---	---



- b) The manufacturer should have technical collaboration/MoU with the LED manufacturer for supply of LEDs and know-how for adequate thermal management to ensure minimum guaranteed performance as given in the specification, the selection procedure for selecting right type of LEDs for such application.
- c) The MoU should also indicate the Quality Assurance Plan (QAP) for handling, storage and life cycle test of the LED proposed to be used.
- d) The manufacturer shall have all the requisite testing facilities for the tests mentioned above at their works. However, special tests such as IP protection, environmental, surge, vibration and shock tests etc. may be carried out in any NABL approved labs and test results shall be submitted to Vendor approving authority.

### 13.2 DETAILS OF ESSENTIAL INFRASTRUCTURE

- Dust free environment with ESD protection for the assembly of LEDs/PCB.
- Testing jigs for the testing of assembled LEDs/PCB.
- Component lead forming machines for through hole devices.
- Temperature controlled automatic wave-soldering machine with auto-fluxing facilities for through hole devices.
- Automatic Temperature controlled re-flow-soldering machine for surface mounted devices.
- Stencil and solder paste application machine for surface mounted devices
- Automatic Device insertion (Pick and place) machine for surface mounted devices with in-circuit testing facility.

All the above facilities are considered essential and shall be verified by Vendor approving authority. However, the firm may outsource only LEDs/PCB assembly and soldering with the sub-vendor at the developmental stage, which shall have the all above facilities. Railways officials may visit the premises of sub-vendor engaged by the firm for LEDs/PCB assembly. The firm shall arrange the visit to the sub-vendor's premises.

### 13.3 MOCK UP Facilities for uniformity and lux level

Actual of the coach compartment/cabin (similar to at least two cabins of 3-tier AC coach) and lavatory etc shall be arranged by the manufacturer for measurement of lux level and uniformity level. Achievement shall be submitted along with the test data of prototype sample being offered for witnessing the prototype tests.

### 13.4 ESSENTIAL MEASURING INSTRUMENTS FOR TESTING

The following instruments with up-to-date calibration are considered essential for testing purpose: -

- Variable regulated DC supply at least up to 300 Volts.
- Heat chamber/oven having minimum range of 0-150°C with alternate arrangement of standby power supply for carrying out endurance tests.
- H.V. Tester.
- Adequate number of meters for measurement of different electrical parameters.

Prepared by  JE/PE	Checked by  Director / PE & Battery
---	--

- Megger (500Volt)
- Measuring Gauges such as Vernier caliper, micrometers, dial gauge,
- Non-contact digital thermometer, contact less thermometer and room thermometer.
- Digital multimeter.
- Digital Weighing machine.
- Complete test bench for measuring the different parameters as mentioned in the specification.
- Milli-ohm/Micro-ohm meter
- Lux meter.
- Storage type Oscilloscope.
- Power analyzer
- Chroma meter
- 8-channel Digital temperature scanner
- Spectrophotometer for single LED checking.
- Computerized test bench for PCB testing
- Computerised test setup for electrical parameter of Light testing
- Centre lathe, CNC milling machine, hydraulic press etc for manufacturing of luminaires (Optional)
- Dark room
- Powder coating plant (Optional)


All the above facilities are considered essential at the developmental stage itself and shall be verified by Vendor approving authority before considering the firm as a developmental source.

\*\*\*\*\*

Prepared by

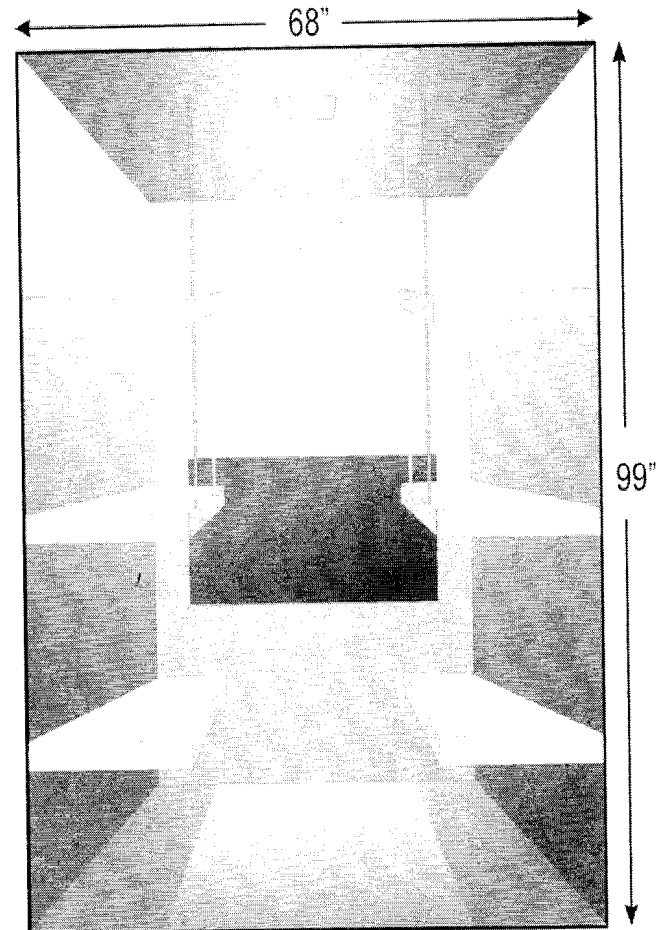
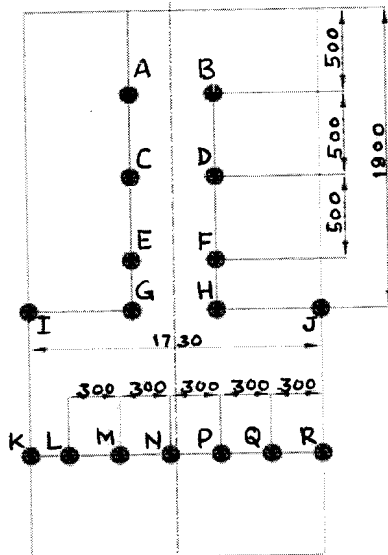
  
JE/PE

Checked by

  
05.7.2016  
Director / PE & Battery

## Annexure -1

## GENERAL LAYOUT OF COUPE (ACCN)



Measurement location	Lux measurement			
	Ground Level	Lower berth	Middle berth	Upper berth
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				
L				
M				
N				
P				
Q				
R				
Linearity				
Uniformity				

Prepared by

  
JE/PE

Checked by

  
08.7.2016
   
Director / PE & Battery

**Annexure-2**

**LUMINAIRE WISE DATA TO BE FURNISHED BY THE MANUFACTURER  
WHILE OFFERING FOR WITNESSING THE PROTOTYPE TESTS**

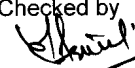
**ILLUMINATION CHARACTERISTICS:**  $T_j = \dots^\circ\text{C}$ ,  $I_f = \dots\text{mA}$

Sl.No.	Parameter	Absolute Values		
		Min.	Typical	Max.
1	Luminous Flux (lm) (Rank ---)			
2	Storage Temperature ( $^\circ\text{C}$ )			
3	Viewing Angle (Degree)			
4	Luminous Efficiency(lm/w)			
5	Dominant Wavelength (nm)			
6	Color temperature (K) (Rank ___)			
7	Forward Voltage(v) Rank (Rank ___)			
8	Colour Rendering Index (Rank ___)			
9	CIE Coordinates (Rank ___)			

Prepared by

  
 JE/PE

Checked by

  
 05.7.2016  
 Director / PE & Battery

## Annexure-3

## Details of LED Light Fittings of LHB, Conventional &amp; MEMU/EMU coaches

Sr. No.	Description	Type of fitting	Drawing. No.	
			PU	NO.
1	LED Light Fitting for Passenger Area (Cabin) of conventional AC coaches	Type-A (18 W)	RCF	CC76452
2	LED Light Fitting for Corridor, Doorway & Gangway for all conventional Coaches (except ICF built AC Coaches) and Non AC LHB Coaches, Passenger area (Cabin) for conventional & LHB Non AC Coaches and Conventional Non AC Chair Car (Day Coach).	Type-B 1 ( 9 W)	RCF	CC76453
3	LED Light Fitting for Doorway & Gangway for ICF built conventional AC Coaches	Type-B 2 ( 9 W)	ICF	ICF/STD-7-6-050
4	LED light fitting for Cabin & Corridor Area of ICF Built SCN coaches	Type-C ( 9 W)	ICF	ICF/STD-7-6-046
5	LED Light Fitting for Lavatory/Mirror	Type-D ( 9 W)	RCF	LW76092
6	LED Light Fitting for Night Light with Berth Indication for AC & Non AC Coaches.	Type-E ( 1 W)	ICF	ICF/STD/7-6-053 (2 Sheets)
7	LED Light Fitting for Berth Reading Light (Longitudinal) for LHB coaches.	Type-F1 ( 2 W)	RCF	LW76093
8	LED Light Fitting for Berth Reading Light Upper Berth for LHB coaches.	Type-F2 ( 2 W)	RCF	LW76094
9	LED Light Fitting for Berth Reading Light Transverse Lower Berth RHS for LHB coaches.	Type-F3 ( 2 W)	RCF	LW76095
10	LED Light Fitting for Berth Reading Light Transverse Lower Berth LHS for LHB coaches.	Type-F4 ( 2 W)	RCF	LW76096
11	LED Light Fitting for Berth Reading Light for conventional AC coaches	Type F-5 (2W)	ICF	ICF/STD-7-6-051
12	LED Light Fitting for Emergency Exit indication.	Type-G ( 1 W)	ICF	ICF/STD-7-6-049
13	LED Light Fitting for Toilet Indication in LHB AC Coaches	Type-H 1 ( 1 W)	RCF	LW76097
14	LED Light Fitting for Toilet Indication in Conventional AC Coaches	Type-H 2 ( 1 W)	ICF	ICF/STD-7-6-052
15	LED Light Fitting for Passenger Alarm Chain Indication	Type-I ( 3 W)	RCF	LW76098
16	LED Light Fitting for SLR Coaches	Type-J ( 9 W)	RCF	CC76457
17	LED Light Fitting for Entrance Doorway	Type-K ( 9 W)		ICF/STD-7-6-048
18	LED Light Fitting for Passenger area (Cabin) for LHB AC Coaches	Type-L ( 18 W)	RCF	LW76090
19	LED Light Fitting with Night light (Corridor Area) for LHB AC Coaches	Type-M ( 9W + 1W)	RCF	LW76091
20	LED Light Fitting for Doorway/Gangway area for LHB AC Coaches	Type-N ( 9 W)	RCF	LW76099
21	LED Light Fitting for LHB type AC Chair Car	Type-O ( 18 W)	RCF	LW76100
22	Dummy Fitting for LHB type AC Chair Car	Type-P	RCF	LW76101
23	LED Light Fitting for Reading Light for LHB AC Chair Car (2 seater)	Type-Q1 ( 2 W)	RCF	LW76102

Prepared by

JE/PE

Checked by

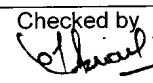
Director / PE &amp; Battery

24	LED Light Fitting for Reading Light for LHB AC Chair Car (3 seater)	Type-Q2 ( 2 W)	RCF	LW76103
25	LED Light Fitting for LHB Non-AC Chair Car	Type-R ( 18 W)	RCF	LW76104 (3 Sheets)
26	LED Light Fitting for Conv. AC Chair Car, EMU & DEMU coaches	Type-S ( 18 W)	ICF	ICF/STD-7-6-047
27	LED Light Fitting for MEMU coaches (DMC/TC)	Type-T ( 18 W)	RCF	CC76460 (9 sheets)
<b>PART DRAWING</b>				
28	Diffuser for LHB type Coaches		RCF	LW76105
29	Frame for LED light fitting for LHB type AC chair Car		RCF	LW76106
30	LED Module box with diffuser		RCF	LW76107
31	Diffuser for LED light fitting for LHB Non AC Chair Car		RCF	LW76108
32	Details for berth reading lights		RCF	LW76109
33	Front Cover		RCF	LW76110
34	Front cover		RCF	LW76111
35	Front cover for Transverse Lower Berth (RHS)		RCF	LW76112
36	Front cover for Transverse Lower Berth (LHS)		RCF	LW76113
37	FRP bracket Assembly		RCF	LW76114

Prepared by

  
 JE/PE

Checked by

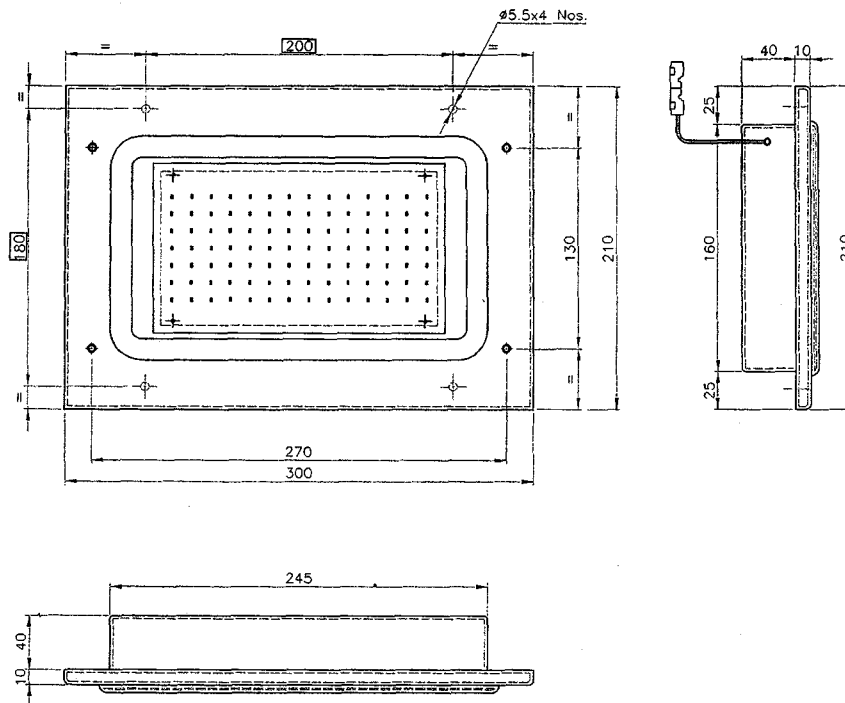
  
 05.7.2016  
 Director / PE & Battery







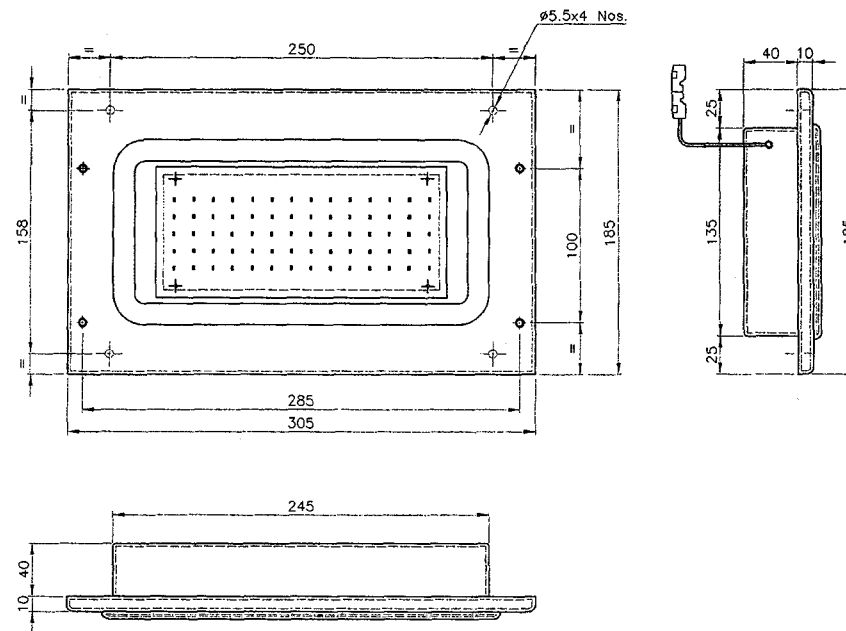


## ALTERATIONS



				GROUP: 7-6				SUPERSEDED BY:					
				LED LIGHT FITTING, TYPE-B2 (9W) GANGWAY AREA OF ICF BUILT CONV. AC COACHES (AS PER SPEC. NO. RDSO/PE/SPEC/TL/0091-2016, REV.1)				SUPERSEDES:					
								SCALE		SSE/D		CHD.	
								1:2.5				ALT.	
										DRN		RATHARAJA	
				CAD FILE: ED-CAD\140 7-6 050---00.DWG				ALT					
ASSEMBLY DRAWINGS										INTEGRAL COACH FACTORY CHENNAI - 38			
20-05-2016				DATA CODE NO.				INDIAN RAILWAY		SHEET			
				140				STANDARDS		1 OF 1			
ALT.	DATE OF LATEST ALT.	DATE OF FIRST ISSUE	DY.CEE/D					ICF/STD-7-6-050					

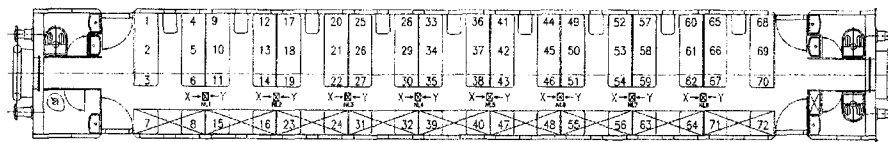
### ALTERATIONS

[illegible]

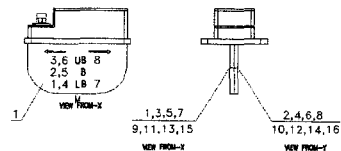




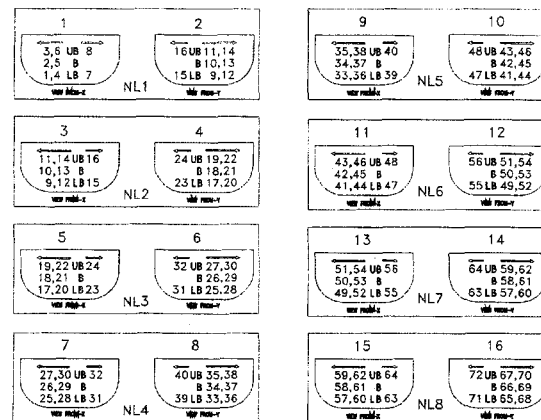
PDF created with pdfFactory Pro trial version [www.pdffactory.com](http://www.pdffactory.com)



REFERENCE DIAGRAM FOR SCN

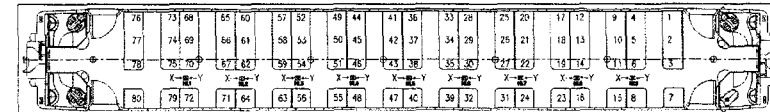


QTY./COACH - 5 FITTINGS WITH INSCRIPTION AS MENTIONED

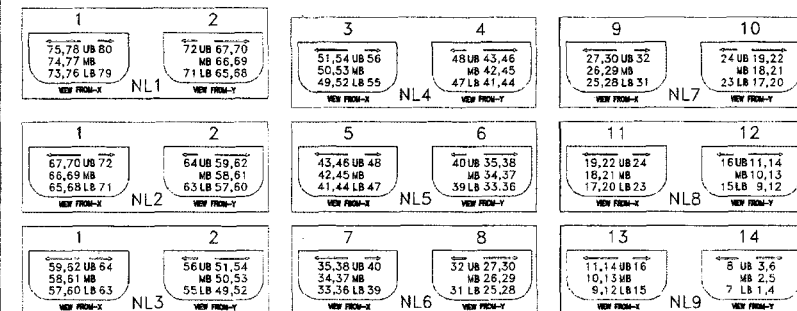


ITEM-5

COL-V



REFERENCE DIAGRAM FOR LSCN



QTY./COACH - 5 FITTINGS WITH INSCRIPTION AS MENTIONED.

ITEM-7

COL-VI

NO. OF ASSY. REQUIRED/COACH

COL	I	II	III	IV	V	VI
WOODWAC	1	1	-	-	-	-
WOODWAC	1	-	1	-	-	-
WOODWAC	1	-	-	1	-	-
SCN	1	-	-	-	1	-
LSCN	1	-	-	-	-	1

NO.	OFF.	DESCRIPTION & DIMENSIONS	ITEM	REF. DES.	MAT. & SPEC.	WEIGHT/LWT	REMARKS
1		LED LIGHT FITTING, TYPE-E (1W)	6				COL-VI
2		FOR NIGHT LIGHT WITH BERTH INDICATION FOR AC & NON-AC COACHES	5				COL-V
3		(AS PER SPEC. NO. 8080/SP/REC/2014-2016 REV.1)	4				COL-IV
4			3				COL-III
5			2				COL-II
6			1				COL-I
7			1				COL-I
8			1				COL-I
9			1				COL-I
10			1				COL-I
11			1				COL-I
12			1				COL-I
13			1				COL-I
14			1				COL-I
15			1				COL-I
16			1				COL-I
17			1				COL-I
18			1				COL-I
19			1				COL-I
20			1				COL-I
21			1				COL-I
22			1				COL-I
23			1				COL-I
24			1				COL-I
25			1				COL-I
26			1				COL-I
27			1				COL-I
28			1				COL-I
29			1				COL-I
30			1				COL-I
31			1				COL-I
32			1				COL-I
33			1				COL-I
34			1				COL-I
35			1				COL-I
36			1				COL-I
37			1				COL-I
38			1				COL-I
39			1				COL-I
40			1				COL-I
41			1				COL-I
42			1				COL-I
43			1				COL-I
44			1				COL-I
45			1				COL-I
46			1				COL-I
47			1				COL-I
48			1				COL-I
49			1				COL-I
50			1				COL-I
51			1				COL-I
52			1				COL-I
53			1				COL-I
54			1				COL-I
55			1				COL-I
56			1				COL-I
57			1				COL-I
58			1				COL-I
59			1				COL-I
60			1				COL-I
61			1				COL-I
62			1				COL-I
63			1				COL-I
64			1				COL-I
65			1				COL-I
66			1				COL-I
67			1				COL-I
68			1				COL-I
69			1				COL-I
70			1				COL-I
71			1				COL-I
72			1				COL-I

INDIAN RAILWAY STANDARDS

SHEET 2 OF 2

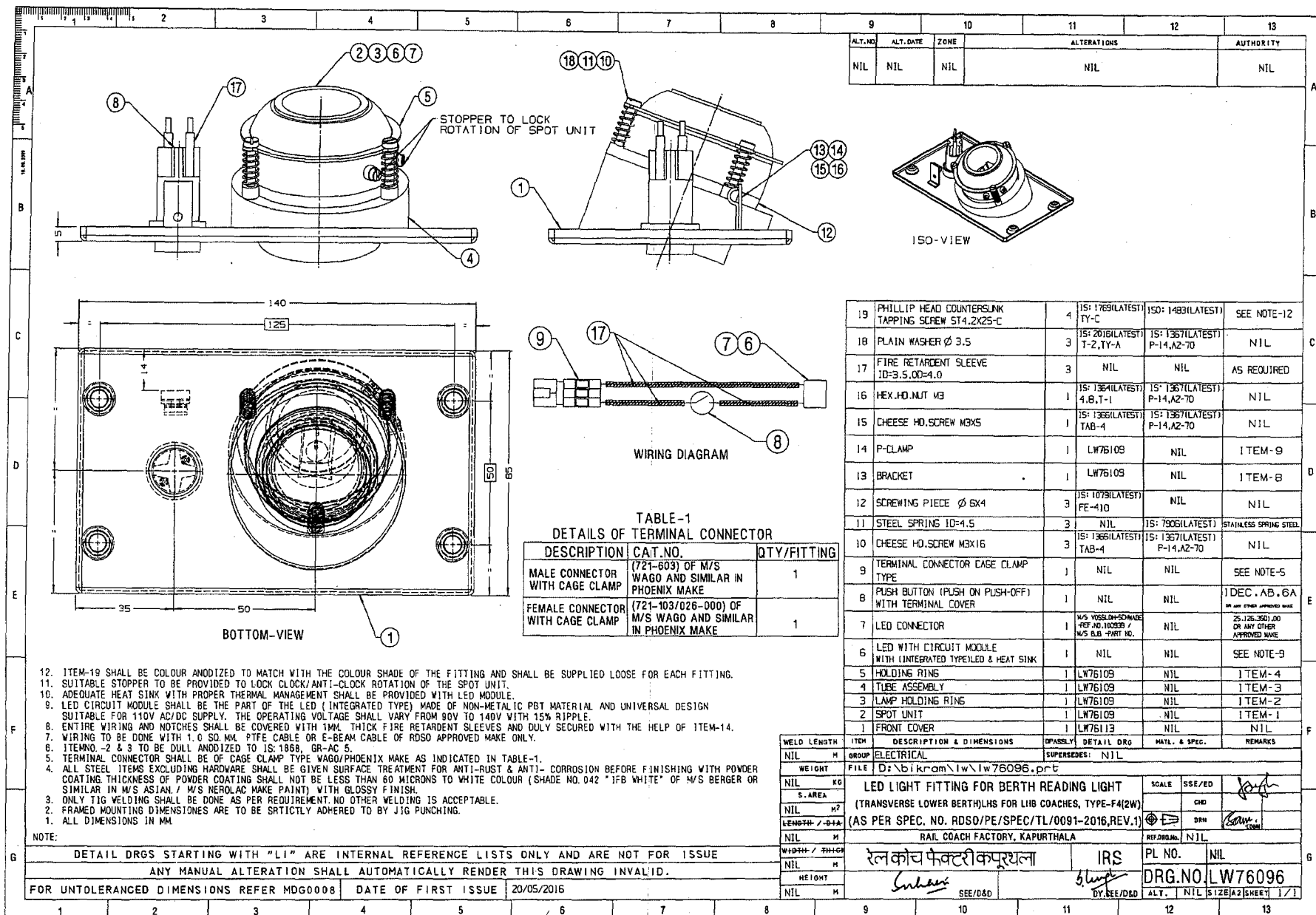
ICF/STD-7-6-053



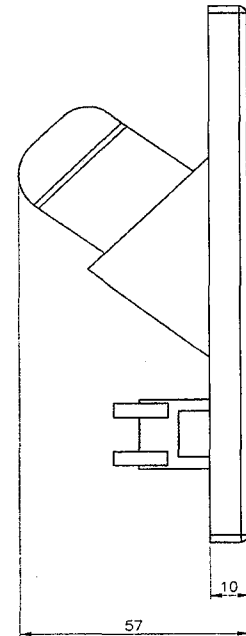
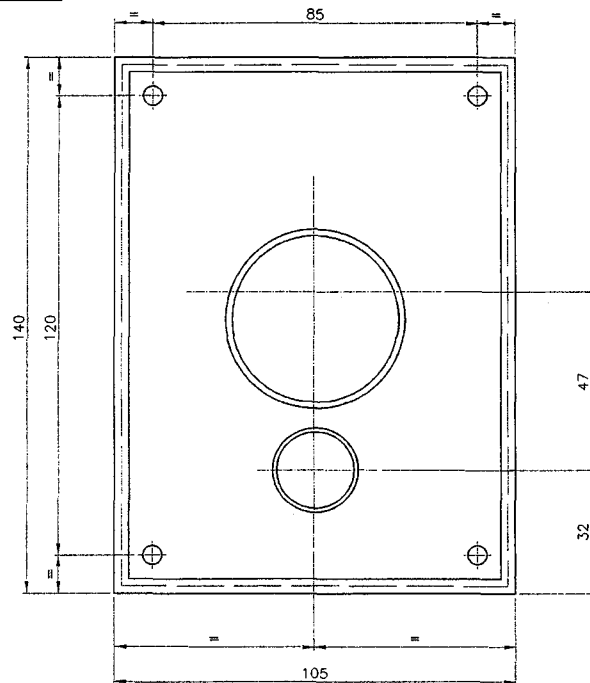








ICF/STD-7-6-051

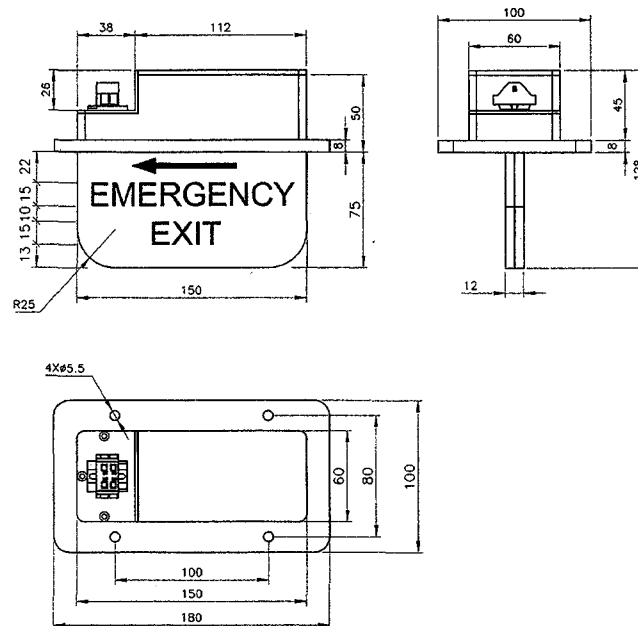


IV III II I				GROUP: 7-6		SUPERSEDED BY:	
<p>LED LIGHT FITTING, TYPE-F5 (2W)</p> <p>FOR BERTH READING LIGHT FOR CONVENTIONAL AC COACH</p> <p>(AS PER SPEC. NO. RDSO/PE/SPEC/TL/0091-2016, REV.1)</p>				SCALE		SUPERSEDES:	
				1:2.5		SSE/D	
						CHD.	
						ALT.	
ASSEMBLY DRAWINGS				CAD FILE: ED-CAD\140 7-6 051---00.DWG		DRN	
20-05-2016				DATA CODE NO.		RATHARAJA	
DATE OF LATEST ALT.				140		ALT	
DATE OF FIRST ISSUE				INDIAN RAILWAY		INTEGRAL COACH FACTORY	
DY.CEE/D				STANDARDS		CHENNAI - 38	
				SHEET		ICF/STD-7-6-051	
				1 OF 1			

FORM IR A3 420x300

ICF/STD-7-6-049

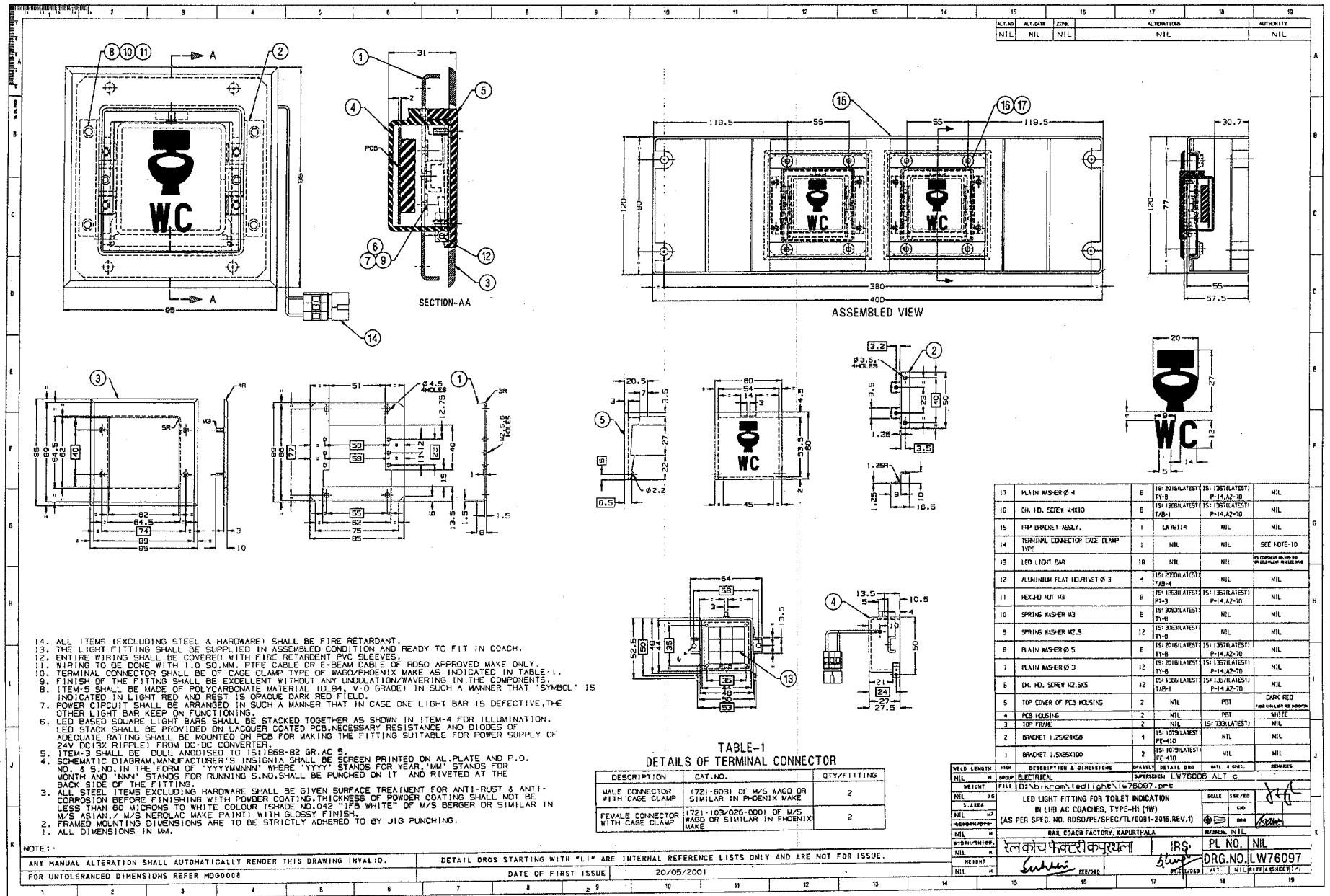
ALTERATIONS



GROUP: 7-6				SUPERSEDED BY:	
LED LIGHT FITTING, TYPE-G (1W)				SUPERSEDES:	
FOR EMERGENCY EXIT INDICATION				SCALE	
(AS PER SPEC. NO. RDSO/PE/SPEC/TL/0091-2016, REV.1)				1:2.5	
CAD FILE: ED-CAD\140 7-6 049---00.DWG				SSE/D	
DATA CODE NO. 140				CHD.	
INDIAN RAILWAY STANDARDS				ALT.	
SHEET 1 OF 1				DRN	
ICF/STD-7-6-049				RATHARAJA	

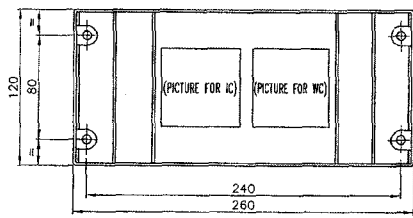
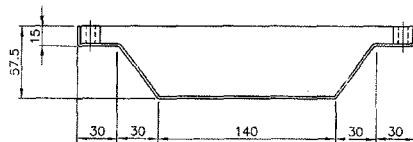
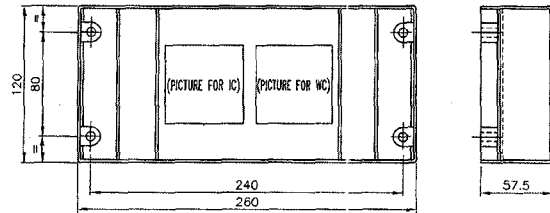
ASSEMBLY DRAWINGS			
20-05-2016	3	20/05/16	
ALT.	DATE OF LATEST ALT.	DATE OF FIRST ISSUE	DY.CEE/D

FORM IR A3 420x300

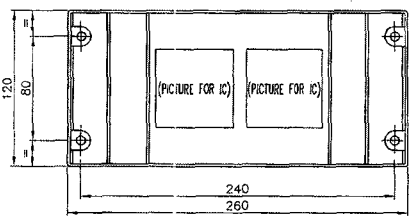


ICF/STD-7-6-052

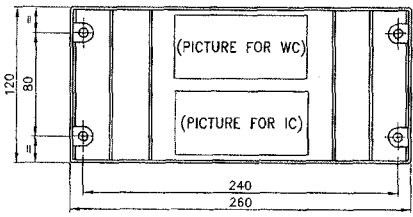
ALTERATIONS  
 07/2016  
 TOILET INDICATION LIGHT  
 FOR WGACCN, WGSCWAC, WGSZAC  
 AND WGFSCWAC COACHES  
 ADDED.  
 SSE/D  
 DY.CEE/D



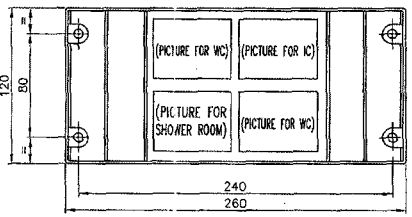
COL-I



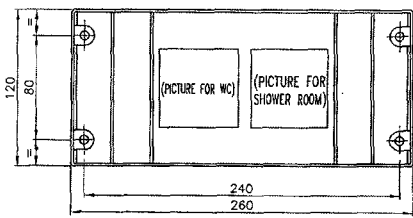
COL-II



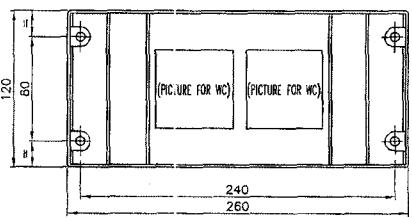
COL-III



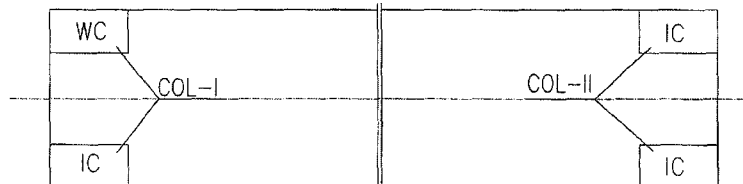
COL-IV



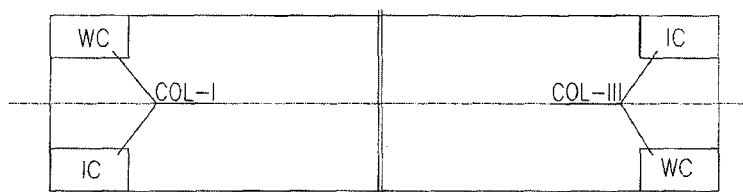
COL-V



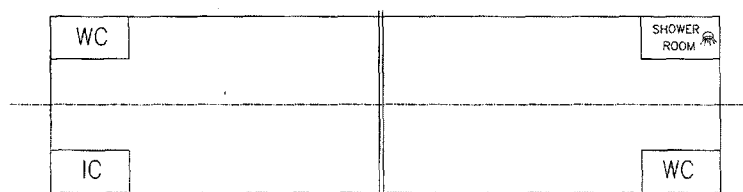
COL-VI



REF. DIAGRAM FOR WGACCN, WGSCWAC, & WGSZAC



REF. DIAGRAM FOR WGFSCWAC



REF. DIAGRAM FOR WGFAC

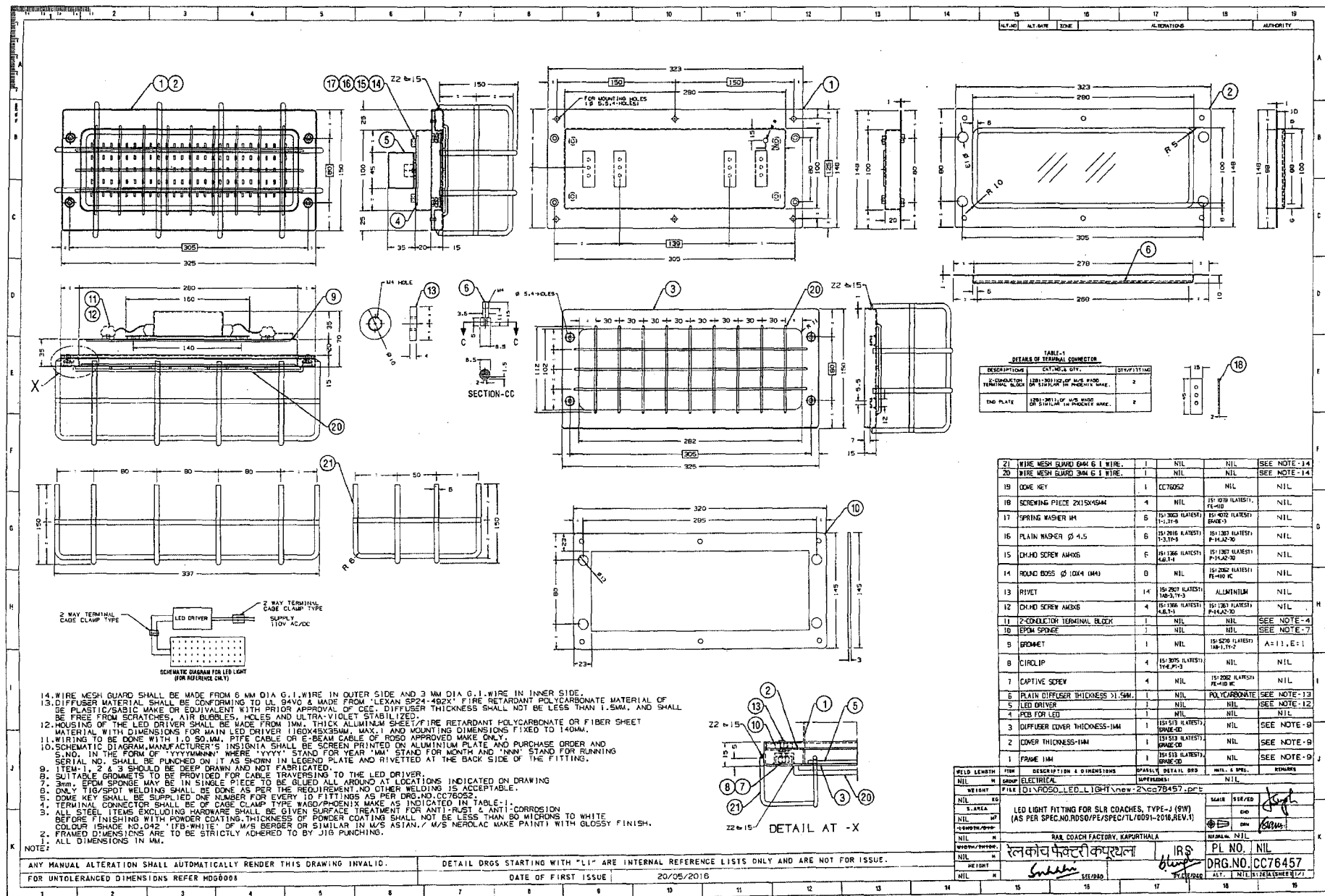
COL-IV

ALT.	DATE OF LATEST ALT.	DATE OF FIRST ISSUE	DY.CEE/D
-07-2016	20-05-2016	3	57.5/2016

GROUP: 7-6	SUPERSEDED BY:
LED LIGHT FITTING, TYPE - H2 (1W) FOR TOILET INDICATION IN CONV. AC COACHES (AS PER SPEC. NO. RDSO/PE/SPEC/TL/0091-2016, REV.1)	SUPERSEDES: ICF/STD-7-6-052/ALT-III/-
CAD FILE: ED-CAD\140 7-6 052-SA00.DWG	SCALE: 1:2.5
DATA CODE NO. 140	SSE/D CHD. N.SASIKUMAR
INDIAN RAILWAY STANDARDS	ALT. DRN RATHARAJA
SHEET 1 OF 1	ALT. 0
	INTEGRAL COACH FACTORY CHENNAI - 38

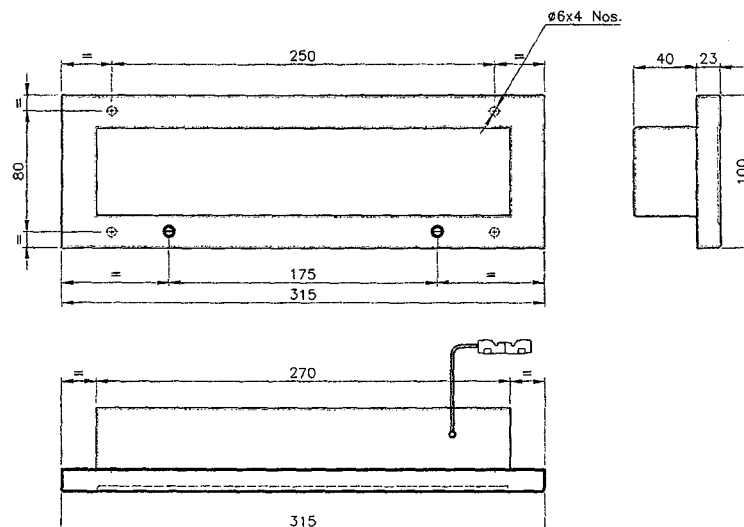
FORM SIZE A2 (600x420)





ICF/STD-7-6-048

ALTERATIONS



IV	III	II	I	GROUP: 7-6	SUPERSEDED BY:		
				<b>LED LIGHT FITTING, TYPE-K (9W)</b> FOR ENTRANCE DOORWAY AREA (AS PER SPEC. NO. RDSO/PE/SPEC/TL/0091-2016, REV.1)	SUPERSEDES:		
ASSEMBLY DRAWINGS 20-05-2016 <i>20-05-2016</i>					SCALE	SSE/D	<i>Handwritten</i>
					1:2.5	CHD.	
					ALT.	DRN	RATHARAJA
CAD FILE: ED-CAD\140 7-6 048---00.DWG DATA CODE NO. 140				INTEGRAL COACH FACTORY CHENNAI - 38			
SHEET 1 OF 1				<b>ICF/STD-7-6-048</b>			

FORM IR A3 420x300





