NAVAL HEADQUARTERS

DIRECTORATE OF ELECTRICAL ENGINEERING

EE- 50-28

SPECIFICATIONS OF LED BASED AUTO EMERGENCY LANTERN
FOR NAVAL SHIPS

ISSUE-1 FEB 11

ISSUING AUTHORITY

DIRECTORATE OF ELECTRICAL ENGINEERING
INTEGRATED HEADQUARTERS MOD (N)
NEW DELHI 110011

RECORD OF AMENDMENTS

SL NO	**AMENDMENT**	AUTHORITY	DATE	SIGNATURE
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INTRODUCTION

1. This EE-50-28 Electrical Specification applicable to all LED Based AEL being fitted onboard Indian Naval Ships and Crafts and is sponsored by the Indian Navy, IHQ MoD(Navy), Directorate of Electrical Engineering, Sena Bhawan, New Delhi - 110 011

2. It is to be applied as required for contracts concerning supply of LED Based AEL for Indian Naval ships

3. If it is found to be technically unsuitable for any particular requirement, the Sponsor is to be informed in writing of the circumstances with a copy to Directorate of Electrical Engineering, IHQ MoD(Navy), Sena Bhawan, New Delhi-110011

4. Any user of this Specification may propose an amendment to it. Proposals for amendments which are:-

(a) Not directly applicable to a particular contract are to be made to the Sponsor of the EE-50-28

(b) Directly applicable to a particular contract are to be dealt with using existing procedures or as specified in the contract.

5. No alteration is to be made to this EED specification except by the issue of a formal amendment by Director of Electrical Engineering, IHQ MoD(Navy).

6. Unless otherwise stated, reference in this EED specification, to “approval”, “approved”, “authorized” or similar terms means “by the IHQ MoD(Navy)”.

STATEMENT OF REQUIREMENT FOR LED BAED AUTO EMERGENCY LANTERN

1. **Scope**. This statement of requirement covers the design and construction of LED based Automatic Emergency Lantern for installation onboard Naval ships. The design of the AEL should be catered for trouble free operation under the most adverse environmental and marine conditions.

Location. The AELs are low level battery operated lighting system and it switches 'ON' automatically in case of failure of power supply to general lighting. These are provided with built in battery charging circuit having features such as trickle charge, boost charge, protection against over charge and deep discharge etc. These are to be sited in the under mentioned areas and purposes to provide sufficient illumination to enable personnel to move with in the ship consequent upon the complete loss of primary lighting system.

All compartments and passageways to indicate exit routes from enclosed spaces to the weather deck.

(a) Machinery spaces and workshops so that personnel do not come into contact with moving machinery.

(b) At exits from galleys and under galley canopies and associated areas to define clearly the nearest escape route, avoiding hot equipment.

3. **Construction**. The AEL casing should be made of cast aluminum alloy (AGM) with suitable glass covering. The enclosure of AEL should be of splash proof (IP65) construction providing adequate protection against ingress of water and dust.

4. **Shock Standard**. Naval Shock Standard (NSS) Grade II in conjunction with BR-3021.

5. **Dimensions.** Dimensions of the AEL should be as specified in technical specifications at para 9 of this EED.

6. **Sea Way Conditions**. The limits of ships motion up to which the system should be fully operational are listed below. These motions may not be concurrent. The equipment shall be capable of efficient and unrestricted operation without any deviation from its normal operating parameters under the following seaway conditions:

(a) Roll : max. $\pm$ 30^0 with 10 sec period

Operational

(b) Pitch : max. $\pm$ 30^0 with 10 sec period

(c) List : max. 20^0 from vertical (permanent) } Survival

(d) Trim : max. 5^0

7. **Input Supply Voltage**. 115/127/230V, 50/60 Hz, 1PH.

8. **Functional and Technical Characteristics**.

The AEL and its built in charging circuit should incorporate following functional features:-

(a) Selection of 115/127/230 V power supply by changing connection at the input terminals.

(b) Provision for automatic 'Boost' or 'Trickle ' charge modes depending on battery voltage with external lamp (LED) indication of battery charging or low voltage.

(c) Low voltage cut off to operate at 5.6 volts to prevent deep discharge, this will be indicated by glowing of lamp (LED).

(d) Over charge protection to enhance the life of battery.

(e) Test push for checking operational state of battery/ lamp.

(f) Charging time of battery should not be more than 12-16 hours.

(g) Full load discharge time of battery shall be 8-10 hours.

(h) Maintenance free leak proof, sealed Ni-mH (Nickel Metal Hydride) battery of 6 Volts 4.5 AH to be used in AEL with proper securing arrangement.

(j) Array of LEDs of 0.8 W to 1.8W.

(k) Instantaneous automatic switching on of AEL in case of failure of main supply.

(l) Power LED should provide 'Reflected angled beam illumination' to avoid eye blindness & direct visibility of LEDs.

9. **<u>TECHNICAL SPECIFICATIONS OF LED BASED AELs</u>**. The LED based AELs should conform to under mentioned requirements:-

(a)	Operating Voltage	-	115V/127V/230V
(b)	Input Supply Frequency	-	50 Hz/60Hz
(c)	Wattage of array of LEDs	-	0.8 W to 1.8W
(d)	Life of Light source	-	50,000 Hrs. min.
(e)	Battery	-	6V, 4.5 Ah, Nickel metal hydride battery
(f)	Battery Life	-	4 years
(g)	Charging/Discharging cycle	-	Around 500 cycles
(h)	Charging Time	-	12 Hrs.initially at around 400mA current.
(j)	Normal Charging Current	-	400mA
(k)	Boost Charging Current	-	600mA
(l)	Type of Circuit	-	Constant voltage, constant current, Programmable constant output Lumens Independent of variation in Battery Voltage
(m)	Lux value of LED source	-	>40 Lux measured at a distance of 1 meter
(n)	Float Voltage	-	7.2 Volts
(p)	Trickle charge Current	-	Around 50 mA
(q)	Full load discharge Time	-	8-10 Hrs. with fully charged battery
(r)	Cut Off voltage	-	5.6 V
(s)	Normal/Boost Mode	-	LED Illuminated tactile switches
(t)	Main Indication	-	Green light (LED)

(u)	Low Voltage Indication	-	Red light LED (5.6V)
(v)	Trickle charge Indication	-	Yellow light LED at 7.2 V with around 50mA current
(w)	Battery Fault Indication	-	This Red LED flickers when the battery becomes dead or battery is removed
(x)	Test push	-	LED Illuminated switches
(y)	Inbuilt protection circuit to protect battery from heating, over charging, short circuits surges etc.	-	An intelligent communication provided between charger and battery for monitoring the temperature/voltage of battery and in case temperature/voltage exceed preset limits the charger automatically comes in trickle mode to ensure long life of battery
(z)	Degree of protection	-	IP- 65
(aa)	Overall dimensions not exceeding to	-	L x W x H = 260 x 140 x 120 mm
	Fixing Arrangement	-	Same as conventional AEL
	Weight not exceeding	-	2.2 Kg without battery 2.6 Kg with battery

10. **Painting**. LED based AEL external body be provided with photoluminescent non- coated rigid polyester glow-in-the-Dark film. It should have high gloss finish, non toxic, non radioactive and does not use electricity. The film should conform to ASTM 2030-06: Recommended uses of photoluminescent Safety Markings and ASTM E2072-04 standard specification for photoluminescent Safety. The film should have service life of minimum 5 years.

11. **Tally And Diagram Plates**

11.1. All tallies and diagram plates shall be of anodized aluminum alloy.

11.2. Diagram plate indicating detail of connection is to be provided and affixed on side of the AELs.

11.3. Size of tally plate, diagram plate, etc. and their letters shall conform to specification NES-723.

12. **Terminals.**

12.1. Bolted type terminals and crimped socket of electrolytic copper are to be provided for incoming supply cables and internal wiring end connections.

12.2. Adequate space is to be provided inside the AELs for bending and termination of cables.

13. **Cable Entry Glands.** Cable entry glands of mild steel for body and naval brass for nut and their sizes shall conform to specification NES 514 or DGS/EED/VI/1535/R6 for incoming & outgoing cables (remote location of LEDs) . Spare gland nut and washers are to be left un-drilled. Cable glands are to be supplied along with the equipment.

14. **Environmental Tests:** The first of lot of AELs would be Type tested as per tests recommended for ship born items in JSS-55555. The AEL is required to under go type /environmental tests as per table given below:-

Sl No	Test	Specifications	Test Conditions/Severity
(a)	Vibration	JSS 55555-Test 28	5 – 33 Hz
(b)	High temp.	JSS 55555-Test 17	55± 3° C for 16 Hrs procedure 5, Test condition 'G'
(c)	Damp heat	JSS 55555-Test 10	40± 2° C at 95 % RH for 16 Hrs
(d)	Drip proof	JSS 55555-Test 11	Vertical water droplet 1m height for 15 min.
(e)	Mould growth	JSS 55555-Test 21	29° C 90% RH mould growth chamber for 28 days
(f)	Bump	JSS 55555-Test 5	1000 bumps, 40g, 6msec,
(g)	Shock /Impact	JSS 55555-Test 24	As per laid down specifications
(h)	Inclination/Tilt	CL 0563 Sec 19	As per laid down specifications
(j)	EMI/EMC	MIL/STD 461 E	As per table II applicable for items installed on ship

15. **Environment Stress Screen Tests** . Type-approved components only shall be used in AELs .All PCBs/ driver circuits used in LED based AELs will be subjected to ESS tests as specified by DQAN.

16. **Receipt Inspection**. The equipment will be inspected by nominated inspector of Navy based on approved QAP and drawings.

17. **PRODUCT SUPPORT**. The supplier should confirm product support for 10 years.

18 **DOCUMENTS**. The format and documents to be provided should be as per JSS-0251-01. The following documentation (02 sets) are to be supplied along with the main equipment with soft copies in CD ROM.

Sl.	Description
(i)	Technical / functional description including that at PCB and component level.
(ii)	Operating Instruction Manual
(iii)	Preventive maintenance routines /repair instructions Manual alongwith drawings.
(iv)	Installation and Test Manual.
(v)	Part Identification list and Tools Catalogue.
(vi)	Test Procedure and Documentation.
(vii)	Certified Test Report.
(viii)	Fault location procedure.
(ix)	List of onboard and B&D spares.
(x)	Performance figures including MTBF and MTTR.

19. **Onboard and Base Depots Spares**.

19.1 **Spares**. The onboard spares, base & depot spares and test equipment is to be recommended by the supplier. Such recommendations are to be commensurate with the reliability of critical components and component used in the system. Special tools and test equipment is to be supplied for onboard maintenance.

19.2 **On Board Spares**. An itemized list of OBS, special tool and special test equipment, which will be supplied with the main equipment, is to be furnished along with the quotation for the main equipment. The OBS and

special tool are to be catered for to facilitate onboard maintenance routines and possible repair by Ships Staff. The OBS and tools should include following:-

(a) All spares required for exploitation of system up to 2 years.

(b) One set of important assemblies to effect “repair by replacement”.

(c) One set of general-purpose maintenance tools.

(d) One set of special tools required for disassembling/assembling of components to effect “repair by replacement”.

(e) One ship set of onboard spares recommended by supplier and approved by Order placing authority be supplied along with equipment. CPL/PIL and item wise cost is to be forwarded along with the list of onboard spares while obtaining approval.

19.3 **Five-Year Base & Depot Spares/Comprehensive Part List**. Base spares recommendation is to cover maintenance/overhaul requirements for 5 years including two refits. Recommendations for insurance holding of long lead items are also to be indicated. Itemized cost of B&D spares are to be forwarded with the main offer.

19.4 Supplier to forward a list of Base & Depot spares for 5 years maintenance indicating Make, Part Number and Cost of each item. The list is to be provided in INCAT documentation format.

19.5 List of OBS and B&D spares are to be provided as soft copies in addition to hard copies in the ILMS format mentioned above.

20. **Tally and Diagram Plates**.

20.1 All units must have tallies and diagram plates conforming to NES 723.

20.2 Diagram plate indicating details of connection, provision of tallies for maintenance line number etc. are to be provided and affixed on the equipment.

21. **Installation Spares**.

21.1 A set of installation spares as recommended by Supplier is to be supplied along with main item.

21.2 **Installation Materials**. All installation materials are to be supplied by the firm e.g. (shock/vibration mounts, free-end connectors/plug/sockets, crimping sockets/terminals etc.) and mounting plate (if required) with fixing holes as mentioned at para 9 (aa) above to complete the installation of AELs onboard ships. Any other material required for installation of the AELs to be supplied by the supplier.

22. **Packing**. Each of the item is to be individually PIP packed, suitable identification label giving details such as Sr. No. of the item, Order No. etc. are to be marked legibly on outside the packing, which should be prominently visible. On board spares/installation spares are to be packed in separate cases individually with word “On-Board Spares” and ‘B&D Spares“ and “Installation Spares” distinctly marked on each cases. The lists are to be attached to the cases.

23. **Performance Responsibility**. Supplier has to under take full responsibility for ensuring satisfactory performance of the LED based AELs onboard ship.

24. **Warranty**. The AELs with associated circuits is to be guaranteed for stipulated performance for 18 month after commissioning. The AELs supplied shall be warranted from defects, manufacturer and performance for the said period and cover all the defects arising from malfunction through design faults, inappropriate material, bad production and non-conformance to specifications. Any expense because of repairs/supply of spares against guarantee defects is to be borne by the supplier.