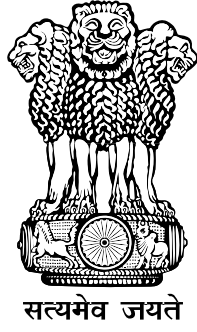


CPWD GENERAL SPECIFICATIONS FOR NURSE CALL SYSTEM 2022



Published under the Authority of
Director General CPWD, Nirman Bhawan, New Delhi



भारत सरकार
Government of India

केन्द्रीय लोक निर्माण विभाग

C P W D

**GENERAL SPECIFICATIONS
FOR
NURSE CALL SYSTEM
2022**



महानिदेशालय, के.लो.नि.वि., निर्माण भवन, नई दिल्ली 110011

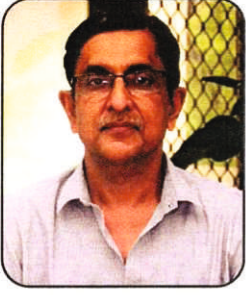
DIRECTORATE GENERAL, CPWD, NIRMAN BHAWAN, NEW DELHI 110011

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DISCLAIMER

- 1. Whereas every care has been taken to ensure that all relevant and essential provisions required for execution of Construction and Maintenance Works are incorporated in this Specification in a simplified and transparent manner, all executing entities referring to are requested to bring it to the notice of the Directorate, if any conflicting provisions/ discrepancies are noticed in the Specification.**
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Shailendra Sharma
Director General



सत्यमेव जयते

भारत सरकार
Government of India



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FOREWORD

CPWD has been maintaining and executing hospitals all over the country. The new hospital works right from system design to installation, commissioning are executed and also operated and maintained under our supervision. Hospital buildings and projects have become highly important all over the country due to Government's priority and commitment to provide world class health infrastructure to the citizens of India. With advancement of technology and variety of services being involved, most of the hospital buildings or projects are complex in nature, sensitive due to human life being involved and also critical due to requirement of 24x7 operation. In recent past many major hospital projects have been allotted to CPWD all over the country for constructing AIIMS, CAPFIMS hospital project, ESI projects besides others. Hence, the need for bringing out the CPWD Specifications for highly specialized services like Modular OT, MGPS, Nurse Call System and Pneumatic tube Transport system was felt.

The first CPWD General Specifications for Nurse Call System has been framed and published for use by field units and others. Nurse Call System is a critical service of hospital infrastructure which involves complex design of Main Controllers, IP Controllers, System switches, Nurse Station Terminal, External Large LCD Display, Patient Handset without voice facility with Connection Module, Bed Head Unit – for wards/Multiple bedded rooms, Patient Hand set with voice facility with connection module, Bed Head unit: for private rooms, Patient call-cancel button without handset, Pull cord unit for WC/ Bath area, Lamp Module/ Zone Light/ Directional Light: Outside room/ ward, Doctor Call & Cancel Button (Code Blue), Room terminal with LCD display for Private Rooms, Nurse Call Server, Backbone / Network switches, Central Monitoring Station with event database software, Integration with IPBX System etc.


The works involving this large multiplicity of components have to be planned and executed in a perfect manner complying to standards with good workmanship to ensure trouble-free and smooth operation of Nurse Call System keeping in mind the utmost important aspect of these life saving services in emergency.

These specifications cover General Specifications for Nurse Call System to incorporate the latest development & technology in the field. References have been taken from the leading international standards and best practices being followed globally.

It is also to put on record my appreciation of Sh. Dharmesh Chandra Goel, ADG(Tech.), Sh. Surendra Singh, then ADG(W), Sh. Vimal kumar, CE(E) CSQ and his team, for putting in untiring efforts in preparing the specifications.

Any errors, omissions or suggestions for modification in this specification may be referred to CE(E) CSQ in the office of Chief Engineer, CSQ(E), CPWD, Nirman Bhawan, New Delhi-110011 on email delceecsq.cpwd@gov.in.

New Delhi
June, 2022


(SHAILENDRA SHARMA)
DIRECTOR GENERAL, CPWD



Dharmesh Chandra Goel
Addl. Director General (Tech)



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भारत सरकार
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PREFACE

Various healthcare facilities & infrastructure are being dealt by CPWD for a long time on the basis of norms fixed by different statutory bodies. With changing needs and passage of time, various modifications were proposed and inputs given by different organizations with respect to norms & guidelines related to healthcare. Since, there are no Specifications available by BIS on the subject of Nurse Call System, which is a critical component in Hospital Projects, a need was felt to compile CPWD specifications for Nurse Call System for the use of architects as well as engineers of CPWD.

CPWD General Specifications for Nurse Call System provides detailing regarding critical components of Nurse Call System.

Whole hearted commitment and considerable efforts has gone in to the preparation of this edition of CPWD Specifications for Nurse Call System. I convey my deep appreciation and sincere thanks to Shri. Vimal Kumar, CE (E) CSQ, Sh. Saurabh Kumar, SE (E) TLQA, Shri. Rajiv Gupta, EE(E)TLQA, Shri Bhagwan Ram, AE(E) TLQA and staff of CSQ(E) unit whose names are not mentioned here for the sake of brevity for their sincere efforts made in the preparation of this document. Various individuals, firms dealing in similar type of work, field units, have immensely contributed with substantial inputs. CSQ (E) unit is indebted for their support.

I convey my gratitude to field offices at Delhi who rose to the occasion and provided sufficient data base to CSQ (E) office and thus enabled them to come out this publication. The team shall now be working on developing schedule of rates of various items involved for execution of Nurse Call System.

This maiden effort has been to bring out this publication in the due care. However, there is possibility of inadvertent errors made. Error or omission may be brought to the notice of Chief Engineer (E) CSQ, CPWD, Room No. 229-A Wing, Nirman Bhawan, New Delhi-110011 (Tele:- 011-23061418) for strengthening these specifications further in larger public interest and in the interest of service towards healthy Bharat.

Suggestions for improvement are welcome.

Place: New Delhi
Date: June, 2022

(Dharmesh Chandra Goel)
Addl. Director General (Tech.), CPWD

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CHAPTER 1

GENERAL

1.1 SCOPE OF WORK

1.1.1 The scope of this specification cover works of Supplying, installation, testing and commissioning of Nurse Call System including the following components on turnkey job basis:

- (i) Main Controllers/ IP Controllers /System switches
- (ii) Nurse Station Terminal
- (iii) External Large LCD Display at Nurse Station or Corridors Display
- (iv) Small Nurse Station/ Duty Room Station
- (v) Patient Handset without voice facility with Connection Module/ Bed Head Unit – for Wards/ Multiple bedded rooms
- (vi) Patient Hand set with voice facility with connection module/Bed Head unit: for private rooms – say Single/Double Bed room/Suite Room/VIP Room
- (vii) Patient call-cancel button without handset – (for remote area hospital, where safety of handset is an issue/ less requirement/ attendant is always available)
- (viii) Pull cord unit for WC/ Bath area.
- (ix) Lamp Module/ Zone Light/ Directional Light: Outside room/ ward
- (x) Doctor Call & Cancel Button (Code Blue):
- (xi) Room terminal with LC display– For Private Rooms
- (xii) Nurse Call Server
- (xiii) Backbone / Network switches
- (xiv) Central Monitoring Station with event database software
- (xv) Integration with IPBX System

- 1.1.2 Nurse Call System is the lifeline of hospital infrastructure. All supports related to patient care are performed with the help of Nurse Call System. Services of hospital can come to a standstill without proper planning of Nurse Call System in the health sector.
- 1.1.3 The Nurse Call System is of high importance and have sensitive nature considering the involvement of human life and hence needs to be planned in a proper manner covering all aspects including material, control cabling for sensors, workmanship, electrical installation, earthing of equipment, fire and water requirements. The related norms for all the hospital items and standards are to be followed to meet the specific requirement of the Nurse Call System.
- 1.1.4 In the above context, the General Specification for Nurse Call System lays down general guidelines to ensure safe, efficient, reliable and economical provision for it and to support hospital infrastructure.
- 1.1.5 While these Specifications serve as general guidelines, appropriate technical sanctioning authority can depart from such guidelines to meet the particular requirements of any work or for other technical reasons including requirement of hospital authority.
- 1.1.6 This chapter covers the general commercial and technical requirements applicable to works contract for execution of Nurse Call System.
- 1.1.7 These General Specifications are subject to revision from time to time.
- 1.1.8 The site modification works as and where required shall include all modifications to the built up space provided at the hospital site to support Nurse Call System required for its smooth and efficient functioning. These works shall comply with all relevant safety and standards guidelines. The firm shall be fully responsible for installation, testing and commissioning of all equipment mentioned in the tender complete as required.

1.2 INTEGRATION & CO-ORDINATION WORKS WITH OTHER SERVICE AGENCIES

- 1.2.1 Nurse Call System firm has to share the Nurse Call System details and layout drawings with other firms and take up superimposing of its own system with other components, pipes, wiring, cables etc, before the commencement of work. The drawings shall also be submitted to the department for such checks and approval and work shall be taken up for execution at site only after the approval of these.
- 1.2.2 Nurse Call System firm has to provide details regarding required cutouts and route of its components, wiring, power socket/data cables/Patch Panel/etc. duly marked in drawings and ensue execution in proper coordination with other services and their execution firms.
- 1.2.3 Nurse Call System firm has to make provision in ceiling for installation of equipment related to Nurse Call System as per approved drawings.

- 1.2.4 In case of existing site, bidders are strongly advised to visit the site for assessment before the submission of tender offer. The layout drawings of the hospital complex project as attached with the NIT, if any, is to be referred to.
- 1.2.5 NCS firm has to integrate their services with other services being executed in the building or existing already.
- 1.2.6 Planning and integration of multiple services along with Nurse Call System in the hospital complex is to be carried out in BIM software at the initial stage (before taking up execution at site) so that clashes of services can be identified and suitable decision can be taken at the planning stage.

1.3 SCOPE OF THE BIDDER

- 1.3.1 Supplying, Installation, Testing and Commissioning (as applicable) of complete nurse call system, comprising of Nurse Station Terminal, Bed head unit modules and Handset modules, Lamp Module, Pull cord for Toilets/ WC, Nurse presence cum cancel, additional help feature, Code Blue/ Doctor Call module, Software, Server, Conduiting and Cabling, connection to the Online UPS/Emergency Supply back up by captive DG Sets, Earthing, control cabling including that from Fire alarm system to Nurse Call System control panel and associated sensors, Site modifications, Comprehensive maintenance of Nurse Call System installations, Integration with other services of Hospital infrastructure (if any), and all items indicated in the NIT etc. as per technical specification.
- 1.3.2 All cable conduits, trenches and railings wherever required.
- 1.3.3 All electrical accessories used in installation of Nurse Call System like cable wire, electrical outlets, switches, Control panels, etc. should be fire proof and of reputed make certified for electrical safety. All wire used in electrical wiring related to Nurse Call System shall be Halogen free flame retardant conforming to IS :17048 as amended up to date.
- 1.3.4 Testing, Installation and commissioning of all equipment/services.
- 1.3.5 Any other necessary work required for satisfactory working/performance of the Nurse Call System and not mentioned/specified otherwise.

1.4 ELIGIBILITY CRITERIA FOR NURSE CALL SYSTEM CONTRACTOR

Nurse Call System work is a specialized work as per CPWD Works Manual and the contractor shall have to fulfill the eligibility criteria or in case of composite contract, engage a specialized Nurse Call System agency for complete design, construction, testing, commissioning and comprehensive maintenance of Nurse Call System.

Tender for the nurse call system work shall be called from following, satisfying the eligibility criteria for the work:-

- (a) Manufacturers/OEMs/ Authorized Dealers
- (b) Specialized firms
- (c) Approved and eligible CPWD Composite category contractors

The eligibility criteria shall be as per following:

The Nurse Call System firm should have successfully completed following Nurse Call System works during the last seven years ending last date of the month previous to the one in which tenders are invited:

Three similar works, each costing not less than 40% of the estimated cost put to tender,
or
Two similar works, each costing not less than 60% of the estimated cost put to tender,
or
One similar work costing not less than 80% of the estimated cost put to tender.

Here similar work shall mean supply, installation, testing and commissioning of Nurse Call System work, which may also include comprehensive maintenance of Nurse Call System installations. Standalone work of Comprehensive maintenance of Nurse Call System installations are not covered in similar work.

(The value of executed works shall be brought to current costing level by enhancing the actual value of work at a simple rate of 7% per annum, calculated from the date of completion to the last date of submission of bid).

1.5 RESPONSIBILITY OF THE CONTRACTOR

- 1.5.1 The contractor shall be primarily responsible for successful supply, installation, testing, commissioning of complete NCS for arranging OEM warranty for products including extended period to cover 10 (ten) years (Comprehensive maintenance of the complete NCS installation for 5 years after completion of Defect Liability Period/Warranty Period of five years).
- 1.5.2 The facility for having online access to the system shall be provided for which Main Server shall be kept on IP connectivity during the problem/fault in the Nurse call system for which firm will coordinate with hospital authorities to have access of the nurse call server for remote monitoring & trouble shooting in time specific manner only for the purpose of trouble shooting of fault.
- 1.5.3 The Nurse Call System firm shall execute complete work including submission of layout drawings, walk-through view and working drawings. If stand-alone Nurse Call System work is to be executed in an existing building, the auto-cad or PDF or hard copies of building layout drawings will be provided by the hospital/ department for preparation of Nurse Call System drawings.
- 1.5.4 The contractor shall carry out necessary modifications in civil, electrical components, demolition and other works as may be required for complete installation and trouble-free functioning of the Nurse Call Systems.
- 1.5.5 The Nurse Call System firm shall coordinate with fire-safety (Fire Alarm & Fire Fighting) firm for installation of fire-safety sensor/instrument inside the Nurse Call System.

- 1.5.6 The executing agency shall coordinate with firms carrying out other building services /works at the hospital for the successful completion of Nurse Call System along with other hospital services.
- 1.5.7 The Nurse Call System firm shall cooperate for installation and commissioning of other medical equipment (like integration equipment, monitors, etc.) in coordination with hospital authorities, respective firm and the department.
- 1.5.8 The firm shall successfully complete installation, testing and commissioning of all nurse call systems along with all equipment included in the scope of work as per technical specifications of Nurse Call System described in NIT.
- 1.5.9 The Nurse Call System firm shall provide factory test certificates for the equipment/ materials/ cables used for the construction of Nurse Call System.
- 1.5.10 The Nurse Call System firm shall supply complete set of manuals for all the systems and sub-systems.
- 1.5.11 The Nurse Call System firm shall arrange at his cost on-site training of consignee/user/ Nursing staff of the hospital for a week by original equipment manufacturer (OEM) or their authorized channel partner, wherever required for operational aspects.
- 1.5.12 Final electrical safety test, system test, and calibration shall be done as per required standard by authorized persons using calibrated test equipment, and declaration to this effect shall be submitted by the nurse call system firm.
- 1.5.13 The Nurse Call System firm shall execute the work of electrical and other works as per CPWD Specifications (wherever applicable). All electrical conduiting shall be heavy duty PVC /MS conduits as per CPWD specification.
- 1.5.14 All queries/clarifications along with pre-installation requirements shall be submitted before pre-bid meeting.
- 1.5.15 The contractor shall supply only new, unused material/goods complying with the NIT specifications. The department reserves the right to accept the item satisfying the NIT conditions having improvements in design and materials in the work.
- 1.5.16 The contractor shall be responsible for comprehensive maintenance of Nurse Call System installations for 5(five) years after completion of Defect Liability Period/Warranty Period of 5(five) years from the date of completion of the work through the same Nurse Call System firm. Change of firm for CAMC, if required, shall be with the approval of department/ hospital/institute/ any other authority designated. The Nurse Call System firm shall be approved on the basis of work experience mentioned in eligibility criteria. The comprehensive maintenance of Nurse Call System installations includes complete Nurse Call System installations, labour, spares, all consumables and filters etc. In the case of Nurse Call System equipment, the comprehensive maintenance shall be done with back-to-back support from OEMs. In such cases, authorized agent of OEM shall reach the site

within 8 hours of raising a service call. A recovery of ₹2000/hour shall be made if complaint is not attended by the contractor within one day of lodging the complaint. The decision of the Engineer-in-Charge shall be final and binding on the firm with respect to the imposition of overall penalty decision taking into view overall circumstances of the case.

1.6 RESPONSIBILITY OF CONTRACTOR FOR SITE MODIFICATION (APPLICABLE ONLY FOR STANDALONE NURSE CALL SYSTEM WORK TO BE EXECUTED IN EXISTING BUILDING)

The “Site Modification” work includes all modifications to the built-up space at the hospital site like civil works, electrical works, plumbing works, interior decoration, air conditioning ducting and other related works required for smooth and efficient functioning of the Nurse Call System. These works shall comply with all relevant safety and standards guidelines. The contractor shall be fully responsible for installation and commissioning of all equipment mentioned in the tender. Bidders are strongly advised to visit the site for assessment before the submission of tender offer.

1.7 RESPONSIBILITY OF CONSIGNEE/CPWD (APPLICABLE ONLY FOR STANDALONE NURSE CALL SYSTEM WORK TO BE EXECUTED IN EXISTING BUILDING)

1.7.1 The hospital/institute/CPWD will provide Nurse Call System shell structure / building / constructed areas (complete with brick works, plastering, etc.) wherever the system is to be installed.

1.7.2 The hospital/institute/CPWD will provide required power supply outlets for the system/ components as required.

1.7.3 The hospital/institute/CPWD will provide required electrical power supply for installation, testing and commissioning free of cost.

1.7.4 The hospital/institute/CPWD will provide space for at least two (as one working + redundant) spare ports each having data transfer rate of minimum 1 GBPS in their LAN switching network for providing an exclusive LAN network for Nurses call system. The agency shall provide LAN system for nurses call system complete with all required items of LAN cabling, patch panels, LAN switches, racks and all their accessories

1.7.5 The Nurse Call System firm shall execute the work in-consultation with the engineers and technicians of the department/ Institute/hospital during installation, testing and commissioning of the system.

1.8 RELATED DOCUMENTS

Each work has its own particular requirements. Therefore, in addition to the General Specifications, governing VDE0834/ UL/ Health Technical Memorandum 08-03: Bed head services and Nurse Call system, Indian Electricity Rules 1956, Standard Contract

Conditions and necessity of additional conditions/ specifications for a particular work should also be satisfied. In case of any discrepancy such additional conditions/ specifications will override these General Specifications. The tender inviting authority shall adopt either of the two standards (VDE0834/ UL/ Health Technical Memorandum 08-03: Bedhead services and Nurse Call system) in NIT for Nurse Call System in consultation with hospital/medical authority.

1.9 TERMINOLOGY

The definition of terms shall be in accordance with (VDE0834/ UL/ Health Technical Memorandum 08-03: Bedhead services and Nurse Call system), I.E. Rules 1956 which are defined in above mentioned specifications. Some of the commonly used terms are indicated in Chapter 2.

1.10 SUBMISSION OF TENDERS

1.10.1 The tender shall be submitted complete with the following:-

- (a) Complete tender documents as purchased from CPWD / downloaded as on website duly filled in and submitted as required. The price part of the tender shall be indicated only on the tender schedule of work as per NIT.
- (b) Earnest Money deposit in one of the specified forms as per laid down rules issued from time to time, as applicable.
- (c) Any other supplementary details required for the evaluation of the tenders such as drawings, technical literature/ catalogues, data etc.

1.10.2 Where two part tendering system is proposed to be adopted in any particular work, the procedure for submission and opening of tenders shall be indicated in tender documents for that work.

1.11 RATES

1.11.1 The work shall be treated as on works contract basis and the rates tendered shall be for complete items of work (except the materials, if any, stipulated for supply by the department) inclusive of all taxes (including GST etc. if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor, watch and ward of all materials (including those, if any, supplied by the department) for the work at site etc.

1.11.2 Prices quoted shall be firm. Price adjustments shall however be governed by Clause 10C/ 10CC of the Conditions of Contract as given in form CPWD 7 or 8 of the tender documents, for works executed under these forms, and as applicable. All relevant documents shall be produced by the contractor to the Engineer-in-charge, whenever called upon by him to do so, for working out such adjustments in rates.

1.12 TAXES AND DUTIES

- 1.12.1 Being an indivisible works contract, GST, excise duties etc. are not payable separately.
- 1.12.2 The works contract tax deductions at source from the bills of the contractor as applicable in the State in which the work is carried out / as per rules shall be done, at the time of payments.
- 1.12.3 Octroi shall not be paid separately for the materials supplied by the contractor, but the Department, on demand, can furnish octroi exemption certificate. However, the Department is not liable to reimburse the octroi duty in case the concerned authorities do not honor such exemption certificates.

1.13 MOBILIZATION ADVANCE

No mobilization advance shall be paid for the work, unless otherwise stipulated in tender papers for any individual work.

1.14 COMPLETENESS OF THE TENDER

All sundry equipment, fittings, assemblies, accessories, hardware items, masonry platforms/ foundation for Nurse Call System works, supports for pipes foundation bolts, supports, termination lugs for electrical connections, cable glands, junction boxes and all other items which are useful and necessary for proper assembly and efficient working of the various equipment and components of the work shall be deemed to have been included in the tender, irrespective of the fact whether such items are specifically mentioned in the tender or not.

1.15 WORKS TO BE ARRANGED BY THE DEPARTMENT (IN CASE OF STANDALONE WORK)

Unless and otherwise specified in the tender documents, the following works shall be arranged by the Department:

- I Storage space for all equipment, components and materials for the work.
- ii Supply of materials to the contractor as stipulated in the tender documents
- iii Space/structure for erection of Nurse Call System structure and related equipment / services.

Note: *In case of EPC contracts, the firm shall be responsible for above as a whole since the complete building/structure to be built shall be within his scope and hence the above item also as per scope defined in NIT.*

1.16 WORKS TO BE DONE BY THE CONTRACTOR

Unless and otherwise mentioned in the tender documents, the following works shall be done by the contractor, and therefore their quoted cost shall be deemed to be included in their tendered cost: -

- i Foundations for equipment and components where required, including foundation bolts.
- ii Making openings for pipes, cables etc. in wall/slabe, cutting and making good all damages caused during installation and restoring the same to their original finish.
- iii Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.
- iv Painting at site of all exposed metal surfaces of the installation other than pre- painted items. Damages to finished surfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-charge.
- v Testing and commissioning of completed installation including performing fluke test for the LAN networking done by the agency as part of the nurses call system networking
- vi Performing free software/firmware upgradations from completing the work till the expiry of defect liability period if no lifetime license is provided by Nurses call OEM. Further, software/firmware upgradation, in case of not having lifetime license, till the end of the comprehensive maintenance contract shall also be in scope of the agency even though the same is not specifically mentioned in the BOQ.

1.17 STORAGE AND CUSTODY OF MATERIALS

Suitable and lockable space for storage accommodation shall be provided by the Department free of cost to the contractor. However the watch and ward of the stores and their safe custody shall be the responsibility of his contractor till the final taking over of the installation by the Department.

Note: Item no. 1.17 shall not be applicable in case of EPC contract. It shall be the responsibility of EPC contractor only.

1.18 POWER SUPPLY, WATER SUPPLY AND DRAINAGE

- i Unless otherwise specified, 3 phase, 415 Volts, 50 Hz power supply shall be provided by the department free of charge to the contractor at one point for installation at site. Termination switchgear however, shall be provided by the contractor. Further extension if required shall be done by the contractor.
- ii The power supply for testing and commissioning of the complete installation shall be made available by the Department free of charge to the contractor. For this purpose, the power supply shall be given at the main incomer unit of the main electrical panel (provided by the contractor) through U.G. cable, or bus-trunking arrangement. The termination of this feeder in the main incomer unit shall be the responsibility of the contractor and nothing extra shall be paid on this account.
- iii Unless otherwise specified in the contract, further power distribution to the various equipment shall be done by the contractor.

- iv Where the power supply has to be arranged by the Department at more than one point as per the terms of the contract, the termination of all such power feeders in the incomer of respective control panels (provided by the contractor) shall be the responsibility of the contractor.
- v The contractor shall not use the power supply for any other purpose than that for which it is intended for. No major fabrication work shall be done at site. Power shall be used only for welding/ cutting works. The power supply shall be disconnected in case of such default and the contractor shall then have to arrange the required power supply at his cost.
- vi Contractor may have to install their DG Set for construction activity. The department do not guarantee for continuous power supply for the work to be carried out.

Note: *In case of EPC contracts, the firm shall be responsible for above as a whole since the complete building/structure to be built shall be within his scope and hence the above item also shall be deemed to be in the scope of firm, as per details given in the NIT.*

1.19 TOOLS FOR HANDLING AND ERECTION

All tools and tackles required for handling of equipment and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

1.20 PAYMENT TERMS

Payment shall be made in Indian Rupees as specified in the contract through electronic transfer in NEFT/RTGS subject to recoveries, if any, by way of liquidated damages or any other charges as per terms & conditions of contract in the following manner:

- i On delivery: 70% payment of the contract price on prorata basis shall be paid on receipt of goods in good condition and upon the submission of the following documents:
Original copies of supplier's invoice showing contract number, goods description, quantity, packing list, unit price and total amount.
- ii On installation: 20% payment of the contracts would be made against successful installation of the item at site, as per NIT requirements.
- iii On Testing, commissioning and completion: Balance 10% payment would be made against Testing, commissioning and completion, subject to recoveries, if any, either on account of non-rectification of defects/deficiencies not attended by the by firm or otherwise. "Final Installation, Testing, Commissioning and Acceptance Certificate" need to be issued by the department after successful installation, commissioning, testing and successful trial run in coordination with hospital authorities.
- iv Payment of Civil/Electrical Works at site: The payment related to Civil/Electrical Works at site will be made as indicated in the contract. Payment for Comprehensive Annual Maintenance Contract Charges: The payment of CAMC will be made on six monthly basis after satisfactory completion of said period, duly certified by the department in

coordination with client department, on receipt of bank guarantee for an amount equivalent to 2.5% of the cost of the equipment as per contract in the prescribed format valid till 3 months after expiry of entire CAMC period. The firm will associate the supplier/authorised channel partner of OEM of the equipment for CAMC for the required period and submit copy of the agreement to the department.

1.21 WARRANTY AND CAMC

1.21.1 Comprehensively all the goods supplied under the contract shall be new, unused and incorporate all recent improvements in design and materials unless prescribed otherwise in the contract. The supplier further warrants that the goods supplied under the contract shall have no defect arising from design, materials (except when the design adopted and/or the material used are as per the Purchaser's/Consignee's specifications) or workmanship or from any act or omission of the supplier, that may develop under normal use of the supplied goods under the conditions prevailing in India.

- i The warranty shall include all spares, labour and preventive maintenance from the date of completion of the satisfactory installation and acceptance till warranty period.
- ii The Comprehensive Annual Maintenance Contract shall include all spares, labour and preventive maintenance from the date of completion of the satisfactory installation and acceptance till warranty period and there after till the period of completion of CAMC as stipulated in the NIT.

1.22 SAFETY CODES AND LABOUR REGULATIONS

- I All the safety procedures outlined in the safety codes applicable for the works shall be compiled with.
- ii In respect of all labour employed directly or indirectly on the work for the performance of NCS contractor's part of work, the contractor at his own expense, will arrange for the safety provisions as per the statutory provisions, B.I.S. recommendations, factory act, workman's compensation act, CPWD code and instructions issued from time to time. Failure to provide such safety requirements would make the tenderer liable for penalty as provided in the labour laws/GCC for each violation. In addition the Engineer-in-charge, shall be at liberty to make arrangements and provide facilities as aforesaid and recover the cost from the contractor.
- iii The contractor shall provide necessary barriers, warning signals and other safety measures while laying pipelines, duct cable etc. or wherever necessary so as to avoid accident. He shall also indemnify CPWD against claims for compensation arising out of negligence in this respect. Contractor shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause. The department shall not be responsible for any accident occurred or damage occurred or claims arising there from during the execution of work. The contractor shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the contractor due to the above provisions thereof.

1.23 SUBMISSION OF PROGRAMME, APPROVAL OF DRAWINGS AND COMMENCEMENT OF WORK

1.23.1 SUBMISSION OF PROGRAMME

Within 10 days from the date of receipt of the letter of acceptance or as stipulated in NIT, the successful tender shall submit programme for complete work including activities like submission of drawings, supply of equipment, installation, testing, commissioning and handing over of the installation to the Engineer-in- Charge etc. This programme shall be framed keeping in view the milestones stipulated in the contract, in which the building progress shall be given priority. In case of EPC contract, in which this is one of the work, the complete programme for the project will include Nurse Call System work also with detailing, matching the over all completion target for the project.

1.23.2 SUBMISSION OF DRAWINGS AND COMPLIANCE SHEET.

The contractor shall submit the drawings and compliance sheet to the Engineer-in-charge for approval before start of work.

1.23.3 COMMENCEMENT OF WORK

The contractor shall commence work as soon as the drawings and compliance sheet submitted by him are approved.

1.24. QUALITY OF MATERIALS AND WORKMANSHIP

1.24.1 The components of the installation shall be of such design so as to satisfactorily function under all conditions of operation.

1.24.2 The entire work including manufacture/ fabrication, assembly and installation shall conform to sound engineering practice. The entire installation shall be such as to cause minimum transmission of noise and vibration to the building structure.

1.24.3 All equipment and materials to be used in work shall be manufactured in factories of good reputation have excellent track record of quality manufacturing, performance and proper after sales service.

1.24.4 None of the equipment/ machines supplied shall be more than six months old from date of supply at site. Copy of GST Gate Pass/ Invoice/ Shipment / Custom Clearance certificate/ details (in case of imported equipment) shall be submitted to prove the date of manufacture & genuineness of the equipment/ machines supplied.

1.25 CARE OF THE BUILDING

Care shall be taken by the contractor during execution of the work to avoid damage to the building. He shall be responsible for repairing all such damages and restoring the same to the original finish at his cost. He shall also remove all unwanted and waste materials arising out of the installation from the site of work from time to time.

1.26 INSPECTION AND TESTING

- 1.26.1 Initial inspection of materials & equipment at manufacturer's premises as per details given will be done by the engineer-in-charge or his representative. For item/ equipment requiring initial inspection at manufacturer's works, the contractor will intimate the date of testing of equipment as applicable at the manufacturer's works before dispatch. The Contractor shall give sufficient advance notice regarding the dates proposed for such tests to the department's representative(s) to facilitate his presence during testing. The Engineer-in-charge at his discretion may witness such testing. Equipment will be inspected at the manufacturer/ authorised dealer's premises, before dispatch to the site by the contractor. For equipment sourced from abroad, the contractor shall at his own expense arrange for the required pre-dispatched tests at the manufacturer's works and submit to the department the details of the tests carried out and the results thereof. Once the go ahead is given, the material shall be dispatched from manufacturer's works.
- 1.26.2 The department also reserves the right to inspect the fabrication job at factory and the successful tender has to make arrangements for the same.
- 1.26.3 The materials duly inspected by Engineer-in-Charge or his authorised representative shall be dispatched to site by the contractor.
- 1.26.4 No additional payment shall be made to the contractor for initial inspection/ testing at the manufacturer's works by the representative of the Engineer-in-Charge. However, the department will bear the expenses of its representative deputed for carrying out initial inspection/testing.
- 1.26.5 Final Inspection & Testing
Final inspection & testing will be done by the Engineer-in-Charge or his authorized representative for the equipment and services provided at site.
- 1.26.6 Safety Measures
All equipment shall incorporate suitable safety provisions to ensure safety of the operating personnel at the times. The initial and final inspection reports shall bring out explicitly the safety provisions incorporated in each equipment.

CHAPTER 2

PLANNING & DESIGN OF NURSE CALL SYSTEM

2.1 PLANNING OF NURSE CALL SYSTEM

Hospital Nurse Call System (NCS) basically empower the patients to summon nursing assistance at the bed space. A basic NCS provides patient-to-nurse (non-speech) calls, and staff-to-staff (emergency) calls. It is considered an essential life safety service. Nurse-call systems are required to be resilient, fault-tolerant and easy to maintain. The “System” shall be designed in such a way that the most effective communication between patient, nursing staff, doctor & management staff can be provided in the least possible time. NCS must log all of the calls & events and provide detailed history reports whenever required or accessed.

Nurse Call System shall be independent life safety system and must be approved in accordance with standards already mentioned to ensure that product is meeting all the specifications & is in compliance with international standard/s applicable for hospital environment systems. It shall possess their own supply or transmission network, independent of third-party systems, that must be controlled and monitored by the devices of the call system itself. According to standards already mentioned below, Nurse Call System functions must always have unlimited priority over all other services and emergency operation must be guaranteed. It shall be compliant to DIN VDE 0834 or ANSI/UL or Health Technical Memorandum 08-03: Bedhead services and Nurse Call system as amended up to date, guidelines for network connectivity and for its components. The guidelines specifically provide for electrical isolation of the system in bathrooms and intensive care areas. Additionally, it is required that unintentional removal of the call cords and emergency call switches extending remotely from signaling units or wall outlets shall be promptly indicated by a visual and audible signal at the call notifications station. Thus, code compliance ensures safety.

In the NCS installation, all functions and services should be integrated at the Point-of-Care to make NCS operations as well as the service, exchange and expansion of the terminal devices, easier. Typically, NCS resides in its specific console (Generally Nurse Station Console) and it's specific LAN while all the value-added services reside in a nurse call server or management centre and reach the point-of-care over existing networks through an integrated terminal device. Since the complete system is on IP, it should also work with hospital existing LAN infrastructure.

The system design shall be decentralised system. It must not happen that any fault in any component like server, software, controller etc. disrupts the working of nurse call system in complete hospital. A hospital cannot afford that the complete nurse call system shuts down due to fault in one component. For this, each controller should not be connected with more than 30 beds. The system shall be in accordance with VDE0834/ UL/ Health

Technical Memorandum 08-03: Bedhead services and Nurse Call system guidelines. Nurse Call System shall be designed and provided for necessary Beds and other areas with Speech and without Speech facility as per site/hospital requirement.

The Nurse Call System with speech facility can be provided for Private rooms (Single Bed/ Double Bed/Deluxe Suite/ Super Deluxe Suite/ Isolation rooms) having attached toilet as per the hospital authorities requirements. The other wards having more than two beds can be provided with basic nurse call system without speech facility.

There shall be particular colour of button for nurse call, nurse presence/ cancel, code blue so that it is easy for patient/ hospital staff to understand and use.

The patient handset shall have antimicrobial/ antifungal coating. The infection from one patient to another patient/ attendant/ hospital staff is a matter of concern in hospital and hence there is a need to put safety at every level to avoid spread of infection.

Code blue/ additional nurse call system requirement shall be programmed in such a way that patient shall not be able to activate themselves. Only nursing staff should be able to activate it using programmable nurse presence button. There shall be no nurse presence/cancel or code blue button on patient handset. It shall be a separate button. Patient handset shall have nurse call button only. Additional nurse help request button (Emergency Call) shall be available on each bed either inbuilt programmable or external and shall be locked with nurse presence to avoid any false emergency calls by patient.

The patient handset with speech shall be Voice over IP with SIP protocol having necessary dial pad to make calls. All the 2-way Speech devices e.g. Nurse Station, Duty station (small nurse station), Patient handset with speech must use VOIP technology and must be IP based.

For NCS, the sound level of audio call signals should be within statutory safety limits and in accordance with VDE0834/ UL/ Health Technical Memorandum 08-03: Bedhead services and Nurse Call system. There shall be different tone & volume adjustment features. There shall be reassurance light in patient handset & bed head unit to inform patient that call has been generated.

The controller must use the VOIP protocol for speech connection. The analogue audio line is not allowed in controller which support Voice / Speech line. In case of failure of Controller, not more than 20 Rooms/ 30 beds should be affected. The physical Server for controlling and handling of system is a must. Any kind of Virtualization software is not allowed.

Each patient handset shall be provided with cradle (bracket) and clips also. Cradle (Bracket) shall be used to keep handset when not in use and clips shall be used to hold handset with bed or any other equipment to avoid damage of patient handset due to fall of handset.

The patient handset shall be spill & shock proof to avoid damage of handset due to fall of water/ food by the patient and for patient safety. If someone pull the patient handset cord with high pressure, it should not damage the handset & bed head unit. The patient handset should be disconnected and disconnection call should be initiated. It will help to reduce the maintenance cost and also avoid theft of patient handset.

2.2 DESIGN REQUIREMENTS FOR NURSE CALL SYSTEM

2.2.1 The fundamental operation of a Nurse Call System (NCS) shall include essential/required operation whose primary function is to provide notification and/or reset/cancellation of a staff initiated or patient-initiated call signal to alert the staff. These operations include all of the following:

- (i) Call annunciation at a nurse's station (audible and visual)
- (ii) Call annunciation at the dome light
- (iii) Call-placed indicator on the patient station (visual), Zone annunciation (audible and visual), and Call reset/cancellation
- (iv) Presence Indication

The Nurse Call System main wiring must be with minimum CAT 6 Cable network and the Nurse Call System must contain devices that perform all of the above listed fundamental operations.

All alarm initiating and signaling circuits shall be supervised for open circuits, short circuits, and system grounds. When an open, short or ground fault occurs in any system circuit, an audible and visual fault alarm signal shall be initiated at the nurse control station. The pin point location of fault for open/ short circuit or any device failure shall be available in software/system to facilitate rectification of the fault in the shortest time.

All necessary equipment required to meet the intent of these specifications, whether or not enumerated within these specifications, shall be supplied and installed to provide a complete and operating nurse call and Code Blue patient communications network.

All the modules accessible to a patient or medical staff shall be POE based only.

The voltage potential difference between any two points, including earth, likely to be experienced by patients or persons associated with the call unit or its cable should not exceed that which applies to medical equipment described in the BS 7671 IEE Wiring Regulations, MEIGaN, HTM 2007 and BS EN 60601-1-1:2001, Version 2, either under normal or fault conditions. The nurse-call circuit should be automatically monitored so that a break in the cable or withdrawal of the plug will initiate a call.

Pendant controls and Nurse Call Switches extending remotely from signaling units or wall outlets shall be so connected that unintentional removal of the device from its socket is promptly indicated by a visual or audible signal at the nurse's station,

There shall be no loss of routine call, emergency, or code call signals while a signaling unit is energized by a standby power source and is operated under normal and signaling conditions.

Operation of a Nurse Call shall result in an audible as well as a visual indication at the Primary Nurse Control Station. The visual indication shall identify the source of the annunciation. The visual annunciation shall be maintained continuously, locked in by either the unit from which the annunciation originated or by the unit receiving the annunciation, until reset manually.

The audible annunciation shall be of at least 3 seconds duration for a continuous annunciation and repeated at least every 10 seconds for a pulsing type annunciation.

Initiation of Code Blue Call signal shall result in energisation of a distinctive audible signal and identified related light at the Nurse Station Console and at the central annunciator panel of a centralized system of the Hospital.

Code Blue Calls can only be cancelled at the originating patient care area or room of origin. Products for use in an oxygen enriched environment (in ICU, Operating Rooms, etc.) shall comply with the Health Care Facilities Code, ANSI/NFPA 99/VDE0834. Only those call cord units that have been investigated and found suitable for use in oxygen enriched atmospheres, are permitted to be used and these will have the following marked on the device: "Note - May Be Used by Patients Undergoing Oxygen Therapy - Hang on Hook (In Holder) When Not in Use."

For a device, such as a switch, intended for emergency service, the word "EMERGENCY" or an equivalent wording describing an emergency condition, such as "PULL FOR HELP" or specific colour/ symbol shall be marked. The marking shall be permanent, in a distinctive colour (preferably red), and on the front of the device. Other type units shall be marked regarding their function.

The Nurse Call Network must be a separate LAN from other Hospital Networks, but capable of interfacing to the Facility Network. (UL requirement)

All Nurse Call Functions must reside on the nurse call network. The system interfaces may occur on other networks, only after proper authorisation and require Risk Management Framework (RMF) evaluation. When authorised, it requires Middleware (Matching switches, servers, and all other network hardware and tools) to communicate between the two systems. Provide dome light indications as recommended in IEEE 602 and the Nurse Call signals shall be flashing red and Code Blue signals must be flashing blue.

To meet the code requirement, "All programming and firmware changes must be accomplished on a working system without interruption to the normal operation of the system", all system switches and controllers, which hold this firmware and system parameters must have DUAL storage. While updates are being made to one set of

firmware, the system must be working and fully functional on the original firmware (i.e. A and B memory blocks). In the event of an error or failure in the update process, the system must revert back to the previous firmware.

- (v) All security patches must be tested and approved for installation to prevent interruption in service.
- (vi) All communications must be full duplex audio, not only on handsets, but all loud speaking devices, including patient, staff, duty, and master stations.
- (vii) Entire Network must be supervised, monitored, patched, maintained, and life-cycled including all sub-stations.
- (viii) Reporting of station failure must be communicated to any designated console, hospital server, e-mail, or wireless device.
- (ix) Remote diagnostics must be provided and utilized.
- (x) Provide network monitoring tool to ensure network reliability.

The Nurse Call System's Reporting Software must allow users to generate and print reports on system activity, as per hospital requirements.

Volt-Amp capacity must be at least 130 percent of the total volt-amp load of the equipment connected to the UPS. It must provide 15 minutes of runtime under the highest system load possible. The changeover time shall be 4.2 milliseconds after sensing AC power line loss. On-battery output voltage must be 230 VAC, ± 10 percent.

The UPS shall have sealed, maintenance free type batteries that have an expected life of at least three years. The UPS unit shall provide a constant voltage battery charger. Provide network reporting of UPS functions and warnings.

HL7 Interface

HL7 standard may be used for interfacing/ integrating nurse call system with HIS depending upon the hospital requirement.

Reports

- (xi) Reports must be exportable in a format specified by the using service, as per following formats:
 - Analysis of Call Data by Area
 - Detailed Analysis of Call Data by Area
 - Analysis of Call Data by Room and Bed
 - Analysis of Call Data by Patient
 - Uninterruptible Power Supply (UPS) to the Nurse Call System
- (xii) If so required, the system generated reports logging all calls, alarms, response time, bed, and staff assignments may be allowed to transmit these reports to a central archiving entity.

- (xiii) Reports function shall be limited by passwords and security tier level access, so that only supervisors may access it when desired.
- (xiv) Connections to the Hospital's LAN/WAN will be allowed only when the proposed system has been demonstrated and certified as meeting the minimum guidelines and requirements of the Life Safety Code.
- (xv) All marking on product component either should be in English/ Hindi language or in some particular colour/ symbol to avoid any language/ literacy issue.
- (xvi) During Normal Operation of NCS;
 - All call must be displayed with scrolling features/ waiting calls.
 - The visual annunciation (LED) should identify the source of the call.
 - The visual annunciation shall be maintained continuously until the nurse call station is reset manually.
 - If the audible signal is silenced there must be a visual indicator.
 - There should be no loss of routine, emergency, or code calls.
 - Code Blue calls must have a distinctive audible and visual signal at the master station. It shall have higher priority than standard calls
- (xvii) Silencing of the audible signal must not result in the de-energisation of the associated light (flashing or steady).
- (xviii) All calls can only be cancelled at the originating patient station or room of origin (except call from two way speech facility).

NCS INSTALLATION

- All NCS devices must be so mounted where they are easy to reach and where confusion with devices from other systems is not possible.
- Since Patient Bedside locations may be Oxygen enriched, only cold LED optical illumination should be deployed there.
- Terminals with displays must be placed well within the field of vision.
- NCS cables must be carried in separate conduits; there should be a separation of minimum 100 mm from low voltage system and minimum 300 mm from high voltage system. The NCS cable insulation must be capable of withstanding a testing voltage of 4000 V effective value for one minute, the complex leakage current must not exceed 0.5 mA. (DIN EN 60950)
- NCS Control Units, Power Supply Units and other parts without operational or indicator functions shall not be placed in Patient Rooms or its substation locations.
- The above device locations shall be adequately ventilated for achieving Heat dissipation.
- The NCS device mounting locations should not receive any direct sunlight.
- The Power Supply Unit should be installed near the largest user component, to prevent voltage drop in the System.

Mounting Heights (Taken from DIN VDE 0834)

(a) Operational Devices, with or without indicator lamps (e.g. call or cancel push buttons)	1.5 m to 1.7 m from finished floor level
Operational devices with text displays (e.g. terminals with displays)	1.5 m to 1.7 m from finished floor level
Non - operational Indicator lamp sand large text displays	1.5 m to 2.5 m from finished floor level
For call switches in bathrooms the special requirements of “barrier-free living” should be taken into account. Call switches in bathrooms must be fitted a minimum of 200 mm above the highest possible position of the shower head or any other faucet in the room.	The pull cord should end 10-20 cm from the floor, so that persons lying on the floor can reach the pull cord.
Corridor Lamp	1.5 m to 2.2 m from finished floor level. If installed above the door, then minimum 200 mm above the door.

(b) Installation Sequence

- Confusion with the wires of other low-voltage system must be excluded by the suitable selection of colours and system of wiring, as per direction of the Project Engineer. (No regulation)
- First lay the individual NCS cables and connect up the plug and terminal connectors, as per approved layout.
- Install the individual NCS power supply unit and check the current supply.
- Connect up the Patient Bed Station Consoles and its substations then check the individual room installations.
- Connect up the Nurse Station Console (control) unit and check the ward installation. Then link the Hospital LAN through LV switch.

(b) **PERFORMANCE PARAMETERS FOR NURSE CALL SYSTEM**

The Nurse Call System shall generate a minimum of following distinct calls:

(1) Routine Call:

Red colour at Dome Lights outside room/ ward. Display at Nursing station with audio tone

(2) Presence Call:

Green Colour at Dome light

(i) Staff Assist Call:

Red light flashing + Green Light (Nurse Presence). Display at Nursing station with audio tone

(ii) Emergency Call:

Red light flashing + Green Light (Nurse Presence). Display at Nursing station with audio tone

(iii) Code Blue Call:

Blue light flashing + Green Light (Nurse Presence). Display at Nursing station with audio tone

(iv) WC/ Toilet Call

Red light + White light for WC call. Display at Nursing station with audio tone

(v) Service Call

Yellow light. Display at Nursing station or duty room with audio tone

(vi) The Code Blue System shall provide the following minimum operational functions:

- Calls placed from any Code Blue station shall generate Code Blue emergency type audible and visual signals at each associated nurse control and duty station, respective dome lights and all local and remote annunciator panels.
- Code Blue calls shall be cancellable at the calling station only. The Nursing Station Console that is managing Code Blue functions shall not have the ability to cancel Code Blue calls.
- Code Blue call must have higher priority than bed call, emergency call or WC call & shall be displayed at nurse station or corridor display on top with highest priority.

(3) Each generated call shall be cancellable at the originating location only (except with speech)

- (4) Calls placed from a bedside station shall generate emergency type visual signals at the bedside station and associated dome light(s) in addition to the previous stated stations and panels.
- (5) Activating the silencing device at any location, while a Code Blue call or system fault is occurring shall mute the audible signals at the alarm location.
- (6) The audible alarm shall regenerate at the end of the selected time-out period until the call or fault is corrected.
- (7) The visual signals shall continue until the call is cancelled and/or a fault is corrected. When the fault is corrected, all signals generated by the fault shall automatically cease, returning the System to a standby status.
- (8) Audible signals shall be regenerated in any local or remote annunciator panel that is in the silence mode, in the event an additional Code Blue call is placed in any Code Blue system.
- (9) The additional Code Blue call shall also generate visual signals at all annunciators to identify the location of the call.
- (10) All calls must be displayed on the Nursing Station Console until they are cleared by the Nursing Staff (at ONLY the originating station).
- (11) If multiple calls are received at the Nursing Station Console within a short period of time, they shall be stacked based on priority and wait time.

2.3 NURSE CALL SYSTEM PROVISIONS

2.3.1 Basic Nurse Call System should be provided on all identified Beds and Treatment Stations

- (i) The Nurse Call System shall be provided on all beds in Critical Care, Patient Care, General Care & Basic Care. In addition, it will be provided in Patient Care Spaces, as listed in the ensuing NCS design matrix in the Hospital. This call can be turned off only at the Call Generating Device Location.
- (ii) A Nurse Call Generating Device must be provided in all toilets, bathrooms and play rooms used by the in-patients, in a ward. The call so generated will initiate a signal that is distinct from the Patient Room Call. This call can be turned off only at the call reset device location, to be located suitably near the toilet or bathroom Call Generating Device Location. Usually the reset device is located in Toilet or Bathroom Lobby.
- (iii) The Basic Nurse Call System shall include provisions to summon assistance from Medical Emergency Resuscitation Teams. Such a call is called Code Blue Call. The Code Blue call generation shall be a secure switch system to prevent erroneous call generation.
- (iv) The Basic Nurse Call System must include additional help, in case of emergency, by the Healthcare Provider attending the Nurse Call. Such a call is called Emergency Call. This call can be generated only after presence of Healthcare Provider has been registered.

- (v) The installed Basic Nurse Call System must be minimal tone visual type. It must provide audible tones and illuminated light sources to annunciate call events
- (B) **Additional Functions on the Basic Nurse Call System** to be provided as per Hospital policy and at the discretion of the Project Engineer/ hospital requirement. When provided, it is called **Advanced Nurse Call System**. Some or all of following Additional Functions on the Basic Nurse Call System may be provided.
 - (i) Answerable Call with voice communication capabilities to enable staff to speak with patients or other staff at locations remote from the patient's room.
 - (ii) Supplemental Communication Systems
 - (iii) When the Nurse Call System is integrated with a Wireless Communication System for providing supplemental call notifications to staff carrying wireless devices, it is called Supplemental Communication Systems
 - (iv) The Supplemental Communication Systems must meet the requirements in VDE0835/ANSI/IEC/ISO 80001-1-1 Risk Management of Medical IT Networks and in ANSI/IEC/ISO 80001-2-5 Guidance for the Risk Management of Distributed Alarm Systems utilizing Medical IT-Networks.
 - (v) All Code Calls except **Code Blue Call**, when provided, will be additional functions.
 - (vi) Medical Device Alarms is an event notification generated by the Medical Device and communicated to the Nurse Station via the NCS LAN.
 - (vii) Primary signaling of a Medical Device Alarm is a requirement of the Medical Device itself, per ANSI/IEC/ISO 60601-1 or other governing regulatory standard.
 - (viii) Use of Telephone Gateway to enable telephony through wired or wireless telephones
 - (ix) Use of alternative technologies, including wireless systems may be permitted for old age home or by the patient in hospital when patient is allowed to move in certain area like park for walking or play room or exercise room. The wireless system should also be monitored & follow necessary VDE0834/ UL/ Health Technical Memorandum 08-03: Bed head services and Nurse Call system guideline.

Note: *The wireless system is not covered in this specifications.*

(x) System Self-Monitoring

- (a) In addition to the call notifications activated by call stations, the Nurse Call System should also provide alert notifications for system self-monitoring events to annunciate trouble conditions which can occur within the system itself.
- (b) An alarm call shall be activated when the cord set (nurse-call handset) unit plug gets disconnected from its socket.

(xi) Operational Requirements of the Nurse Call System

- (a) The Nurse Call Generating Device shall be placed within easy reach, at the head end/ bed head panel of the patient bed.
- (b) The Nurse Call Generating Device shall also be provided in the Ward Treatment Rooms.
- (c) The Nurse Call System should be capable of De-centralised Operation, whereby all generated calls, within the ward, reach the Healthcare Providers directly in the responsible Nursing Station.

(d) NCS shall be capable of integrating to;

- In-building wireless telephone systems
- Hospital data gathering and reporting software
- Public Address System
- Select Electronic Medical Record (EMR) system(s)

(e) Patient Bed Call

- The Call Generating Device in Patient Console will have a call button which must be red in colour and provided with a clear pictogram and must be illuminated, when dark.
- The call generation must be indicated optically in the call button or in the immediate vicinity, by means of a reassurance lamp.
- Each bed must have a unique alphanumeric identification number (Hospital Wide) assigned to it and this should be displayed at the Nurse Station Console along with ward name (like ICU/ HDU)/ floor no. etc.
- In a multi-bedded ward bay, one Patient Call Station shall be permitted to serve two Call Generating Devices on two adjacent beds, if so designed. However, if patient handset is provided then there shall be separate patient handset with single bedhead unit.
- Call buttons in bathrooms must be specially designed for the moist environment, prevailing in Toilet or Bathroom.
- In all designated patient rooms, the presence marking must be switched on through operation of the presence button or through automatic logging. The presence button must be green; the state of the switch must be indicated optically within the button or next to it. The button should be positioned near the door and can be integrated with dome light. The indicator light should be in the dome light and Zone light. The presence button – if there is one – for a second group of personnel may be yellow.
- A generated nurse call, or code call, generated by the patient or by the Healthcare provider, can be turned off only at the station, room, or space from where it originates.

(f) NCS LAN

- Hospital Nurse Call System network must be a separate LAN from other Hospital

networks, but capable of interfacing to the Hospital network(s). Match switches, servers, and all other network hardware and tools required for the Nurse Call System for this interface.

- The Nurse Call System network must not utilize any other Hospital network to accomplish any of the Nurse Call Functions of the Basic Nurse Call System.
 - The Nurse Call System network must support all specified call processes to facilitate work flow and call escalations (to various staff and or groups) functions.
 - Hospital NCS is to be subdivided into separate zones, independent of each other, to cover a maximum area of one Nurse Station. Faults in one of these zones must not affect the remaining zones.
 - Entire Network must be supervised, monitored, patched, maintained, and life-cycled including all sub-stations. Reporting of station failure must be communicated to any designated console, PC, e-mail, or wireless device.
- (g) When a call has been generated by a patient;
- It should be registered at Nurse Station Console
 - It should identify the specific location from which the call was generated
 - It should activate a visual signal in the linked corridor via Dome Light
 - It should activate any associated fixed or mobile supplemented communication device, the handheld mobile device carried by a staff member (in case of wireless systems).
 - The existence of a call should not prevent any other call from being made. The resetting of a call should not cancel or affect any other call that is in force. (An exception is where a WC/bathroom suite is controlled by a common reset unit.)
- (h) Provide a single over-door lamp to indicate any of the calls collectively when groups of calling points occur, as in multi bed wards, WCs and Bathrooms. This arrangement would continue with any duplicated corridor repeater lamps and also at the staff communications base.
- **Call Cancellation**
A generated call, emergency call or code call, generated by the patient or by the Healthcare provider, can be turned off or cancelled only at the station, room, or space from where it originates.
- (j) **Call Escalation Mode**
- The Nurse Call System must have automatic Call Escalation Mode as part of the de-centralised operation. It means that if a generated call is not responded to at the Nursing Station, within a pre-determined time, the operation mode “automatic” is activated and

the generated call is Escalated to two other pre-determined Healthcare Providers locations where the Healthcare Providers can be found. A visual indicator in first responsible Nursing Station will light up to indicate the call Escalated event.

- The scope and the location of the Call Escalated zone linking should be specified and capable of being customised.

(k) Call Forwarding Mode

The Nurse Call System must have automatic Call Forwarding Mode as part of the decentralised operation. It means that if a nurse station terminal is not operational by hospital i.e. nursing staff is not available due to any reason like less no. of patient/ night time etc., the generated call from the bed/ room should be forwarded to the pre-defined Nursing Station, within a pre-determined time, the operation mode “automatic” is activated and the generated call is forwarded to the other pre-determined Healthcare Providers locations where the Healthcare Providers can be found. A visual indicator in first responsible Nursing Station will light up to indicate the call forwarding event.

- (xii)** The Hospital NCS shall incorporate decentralized, distributed intelligence architecture and be built on an IP (Internet Protocol) network. It shall allow both data and voice to be distributed over a common network infrastructure, which is consistent with the communication industry. It shall provide a means of interoperability with 3rd party wired and wireless network devices within the Hospital.

(xiii) NCS Software

NCS software is a combination of NCS programs, User Interface Software, Operating System Software and Hospital Information Technology Interface Software that together deliver a complete Nurse Call Management System.

The NCS program, specifically the User Interface Software that runs on the Nurse Station Console must have, at the minimum, following capabilities.

- (a) Ability to display all calls, source of call (room, bed) and call type placed (Routine, Bath, Staff Emergency, etc.) and light up the indicator lamps in Dome Light, Zone Light, as applicable.
- (b) Ability to filter call activity based on call priority, Supplemental Code Blue Display(s), user configurable List Views.
- (c) Configurable menu task bar, Font size and colour. (d) Ability to set user-defined call tones, colours, and verbiage.
- (e) Ability to set user-defined quiet mode parameters.
- (f) Ability to display all self-monitoring outputs.
- (g) Ability to accept ADT HL7 input.

- (h) Method to manually input into the nurse console station/ software, the details of the various stations.
- (i) Ability to accept information from an external system.
- (j) Ability to send information to an external system.

Note: *Wherever 3rd party integration is required, then it should be specifically mentioned in the BOQ/NIT, elaborating the requirements. to avoid any confusion later on.*

- (k) Store unlimited pre-set alphanumeric messages sent to any connected device.
- (l) Automatic escalation allowing a call to be forwarded if a call is not responded in a specified time period.
- (m) Where applicable, ability to send an unlimited number of messages to any wireless device from any nurse Station console.
- (n) Password protection for critical and noncritical levels of system setup, allowing access to authorized personnel only.
- (o) Call tone volume control (preferably, password protected) with automatic/ Manual volume decrease at designated time of day (Quiet Mode).

(xii) Interface Engine

Each Nurse Call System shall connect to the Hospital's network via a software bridge that isolates the Hospital network from the nurse call network.

This connection to the hospital's network shall allow the integration of supplemental systems such as:

- (a) Reporting Database and Management Reporting
- (b) Patient/Staff Assignments
- (c) Automatic/Manual Messaging
- (d) This integration shall provide a single database for the entire facility, for ease of administrative maintenance.
- (e) The Management Reporting software shall record all events and store them for export to database.

2.4 NURSE CALL SYSTEM OPERATION

2.4.1 When conditions are normal, the LC display of nurse station shall display date & time. There shall be lamp indication on patient handset to indicate that system is available & working as required as per standards. Any fault/ trouble in the system shall be displayed on the nurse station unit. Patient handset, bed head unit & other modules shall have finder light & reassurance light as per guidelines to ensure patient about call generation.

- (b) The patient can request for a nurse-call by pushing the button on the handset, where upon, the red color lamp at the bed head unit, handset and door display unit starts blinking. Simultaneously, the bed number/toilet number along with type of call (Bed call or Emergency Toilet Call or Code Blue etc.) gets displayed on the central display unit at the nurse station, accompanied with a tinkle chime.
- (c) Call can be acknowledge from where call is generated (except two way speech call). To ensure patient that call has been generated, there is small LED on patient handset called reassurance lamp (as per guidelines) which will glow.
- (d) On arriving at the bed from which call has originated, nurse can reset by pushing a reset button at the bed head unit inside the room. Upon its reset, all the display lamp indicators on various devices/modules shall revert to green.
- (e) In case, the nurse requires an additional help to handle the patient, Nurse Help Request (NHR) feature shall enable the attending nurse to seek additional immediate assistance from the standby nurse at the desk. This type of call registers as an emergency at the nurse-station.
- (f) The Code Blue Alert (CBA)/Doctor call feature shall be a hospital-wide alert and is installed in each patient bed to cater specifically to situations where a life threatening emergency prevails. Personnel/Doctor needed for assistance may have to be summoned from any other area of the hospital, in case they are not already present in the ward where the emergency prevails. Hence, the alarming bed number shall be relayed in emergency mode on the screens of all the nurse-stations in the hospital along with suitably recognizable audio alerts like “attention code blue emergency”. This feature shall have Doctor call cancellation facility also.
- (g) In case of a delay in attending to the patient, the audible chime on the central display unit shall repeat automatically till the patient is attended to.
- (h) In case, more than one call registers, all pending calls shall be displayed on the central display unit, with the reminder chime repeating till the last patient has been attended to.

The patient can trigger an emergency alert call from the toilet. Emergency Alert calls shall be clearly distinguished from normal calls. The bed/room/toilet number shall flash on the central display unit monitor with a fast frequency and the chime repetition rate shall also be faster implying urgency.

In addition, a Shower Pull Cord Unit (SPC), wherever decided, shall be installed in the shower stall area within the patient's toilet. This unit shall be specially anchored in the wall and shall be designed even to take the load of a patient's body weight, if the situation so requires. When pulled, the unit triggers an alert which shows up on the nurses' display as a patient emergency requiring immediate attention.

The Nurse-Call Response Monitoring (NCRM) station/server shall ensure on-line, real-

time monitoring of all calls throughout the hospital by Floor and by Ward. The software shall record the date & time of call generated by patient & call cancel by nurse with type of call. It stores the details in a database for future reference. This feature shall also offer daily, weekly or monthly reports, ward-wise call frequency charts and daily detail records. The information shall be displayed on one or more designated PCs and can also be linked through the Server to the Hospital's Information System (HIS) as and when required in future. In that case, users with access to the LAN shall be able to generate reports from local work stations. Server of nurse call system shall be supplied & configured by the OEM only.

The fault in NCRM station shall not affect the working of nurse call system in the hospital.

2.5 NURSE CALL SYSTEM CONFIGURATION

- 2.5.1 The NCS Configuration is an IP based LAN infrastructure with network speed up to 1 Gbps that provides access to network communication services and resources for end users and devices spread over a single floor or building, in a hospital.
- 2.5.2 Usually, it is a number of small, hard wired, networks interconnected using LAN switches. The De-centralised Hospital NCS when connected to Hospital's HIT System, can also utilize the resources deployed in Hospital's HIT System, like Wi-Fi connectivity, etc. Specifically, this design provides a network foundation and efficient data distribution.
- 2.5.3 The NCS Configuration is determined by the Number of NCS Controllers and Nurse Station console (Prime Network Control Systems) deployed. In a Typical NCS, each NCS Controller can control minimum 8 to maximum 128 network devices or VOIP based PoE Devices.
- 2.5.4 A typical NCS Controller controls Patient Station Consoles, Nursing Station Console, Peripheral Stations, a set of Lights as have been deployed and other related devices, via a NCS LAN. Average 4 - 48 Patient Station Consoles (VoIP based or w/o voice) are controlled and when this number is exceeded, a second controller may be deployed.
- 2.5.6 When the NCS is extended to the attached Toilet, functionally, it is an independent call station and the call generated from such a Peripheral Station Pull Cord Unit shall be cancelled from cancel button inside the Toilet only & should be freely programmable to meet site/ client requirement.
- 2.5.7 In case of multi-bed ward the Pull cord unit in toilet must work independently and must have separate cancel button which shall be independent of patient console.
- 2.5.8 For rooms/ ward having multiple beds, each Patient Station Console will be connected to a 5 colour Dome Light installed at the corridor entry to the room or the ward where the Patient Station Console is located. Such a Dome Light will indicate the Call status for all Patient Station Consoles in that room or ward, as also the status of all Peripheral Station Pull Cord Units located in that room or ward. The dome light shall be programmed in such

a way that whenever any patient generates the call, this dome light shall become active. It will also be connected to a Zone Light or an additional corridor light, if so required, as per floor layout.

- 2.5.9 For each Patient Room the Dome light is required with 5 colours viz Red, Blue, Green, White, Yellow. (Red for Bed call, Blue for Code Blue, Green for Nurse presence, white light for WC calls, Yellow for service call etc.).
- 2.5.10 In case of a detached (Separate) Toilet or Bathroom or Persons with Disability (PWD) Toilet, the Peripheral Station Pull Cord Unit and the Emergency Push Button Console (wall mounted) and Reset Switch for Bathroom and Toilet will be treated as an independent Patient Station Console for configuration.
- 2.5.11 In case of a detached (Separate) Toilet or Bathroom or Persons with Disability (PWD) Toilet, a separate Dome Light will be provided at the corridor entry to the detached (Separate) Toilet or Bathroom or Persons with Disability (PWD) Toilet. If the common toilet has multiple WC/bath area, then independent dome light with each WC/bath area or common light module shall be installed.
- 2.5.12 The Nurse Station Console or NCS Controller shall have large LC display Monitor to show multiple calls. Nurse station shall have multiple buttons for various function like date/ time, reminder calls, call forwarding, nurse presence at nurse station etc. However, an external LCD monitor of size suitable for client (20 inch/32 inch/ 40 inch) can also be connected for better indication specially where nurse station size is big/ multiple nurses are working on a single nurse station for easy viewing. The external monitor can also be installed in corridors,
- 2.5.13 Activation of Code Blue call must be by Nursing Staff only from the Patient room/ ward only. All Peripheral Units shall be so configured that code blue signal, wherever generated, is received and processed by the Patient Station Console only for transmission to Nurse Station Console. So for activation of code blue, Nursing Staff present must be set via Presence / cancel button i.e. code blue activation= Nurse Presence Button + Code Blue button.
- 2.5.14 If required, the Code Blue Call shall be transmitted to Hospital's HIT Server and there it will generate a Code Blue paging call over the Hospital's Paging System via DECT phone interface over SIP trunk.
- 2.5.15 In IP based system, the controllers require power supply and IP base controllers provide POE to NCS modules including nurse station console (IP based), lamp module, patient console etc. The NCS power supply module unit will be connected at Nurse Station Console and power shall be distributed to all other devices by NCS LAN as PoE. or Power over bus. The separate 24VDC to any of peripheral Device like Lamp module/ Patient Station should not be allowed.

- 2.5.16 All Patient Station Consoles and Reset Switches, in detached (Separate) Toilet or Bathroom or Persons with Disability (PWD) Toilet, in a ward, shall be connected to a Nurse Station Console/Controller. The patient console, WC (separate/ detached), PWD shall be programmed & any call generated shall be displayed on the nurse station with bed no./ ward no.& name with type of call (Bed call/ WC call/ Code blue)
- 2.5.17 Optionally, in the long ward corridors, for additional notification, one or more, additional Display Unit, a 32 inch minimum or larger display Monitor (or display size as per site requirement), configured as a slave unit of the Nurse Station Console Display Unit, may be provided. These can be located either on the ward corridor wall or ceiling hung in ward Corridor, so that the display is visible from anywhere in the ward corridor.
- 2.5.18 The NCS system must be independent from any other System. Therefore, NCS server shall be separate from HIT Server. However, NCS server can be integrated to HIT Server for forwarding the Events from Nurse Call. Any fault/ failure in the NCS server shall not affect the functioning of the nurse call system in the hospital. The nurse call system shall keep working as standalone through various controllers installed in the hospital.
- 2.5.19 This NCS Installation shall be provided complete with LAN Cable, conduits, raceways, switches, racks, TCP/IP LAN Switches for interfacing with Hospital LAN, etc. and all NCS Software, Operating Software and Networking software.

2.6 DESIGN SHEET OF NURSE CALL SYSTEM

For the purpose of working out the inventory of items for nurse call system, sample design sheet is indicated below, as per which the detailed requirements of each item needs to be worked out and indicated in the NIT. Each system shall have its own specific requirement and the inventory will have to worked out based on such requirements of hospital authorities and site, complying to the relevant standards.

Floor	Area (Location)	Rooms	Beds	Toilet	Bath area	Nurse Station		Patient Handset		Call-Cancel Button	Pull cord		Code Blue Button- For wards	Lamp Module	Controller	
						Nurse Station	Nurse station with external wall mounted LCD monitor	Small Nurse Station	Handset w/o voice with bed head unit		Handset with voice with bed head unit & room terminal	Pull Cord call with cancel				Pull cord call only
GROUND FLOOR	Wing-A															
	Observation Ward - Male	2	12					2	12				1	2	2	
	Observation Ward - Female	1	6					1	6				1	1		
Observation Ward - Female	1	3						1	3				1	1		
	Triage Ward	1	6	1				1	12		1		1	1		
	Bed ICU	1	30	6			1		12		6		1	1		
	Wing-B															
	4 bedded room	7	28	7	7				28				7	7	4	
	3 bedded room	1	3				2		3		14		1	1		
	Private room	11	11	11		1				11		11		11		
	Private room	20	20	20						20		20		20	6	
	Semi Private room	8	16	8		2				16		8		8		
	TOTAL	53	135	53	7	3	3	5	76	47		21	39	13	53	12

2.7 NURSE CALL SYSTEM–FUNCTIONS/DEFINITION OF CALLS

2.7.1 CALL (NURSE CALL, BED CALL)

Call made by an inpatient (person), requiring assistance, with the aim of being visited or spoken to by a Healthcare provider, call being made from the call equipment located by the bed, and the call can be selectively recognised to the point of its origin. The Call Generating Unit is also called Patient Station Console.

Each bed must have a device for call release assigned to it, which can be easily and safely reached by the patient. The call button must be red with a clear pictogram and must be illuminated when dark. This applies correspondingly to all other rooms in which patients could be found. The call release must be indicated optically in the call button or in the immediate vicinity by means of a reassurance lamp. Call buttons in bathrooms must be specially designed for this environment.

2.7.2 ANSWERABLE CALLS

Call from a device with speech possibility by the bed or in the room. In systems with speech communication, calls with speech that have been answered may be remotely cancelled at the place where they were answered.

2.7.3 NON-ANSWERABLE CALLS

Call from a device without speech possibility. The call location must be visited. Calls without speech communication must not be cancelled remotely. Only call acknowledgement is permissible if the call response is monitored by the system

2.7.4 PRESENCE

Marking of the presence of Healthcare Provider by means of a presence button when entering a room connected to the call system.

In all rooms in which the personnel should be contactable by calls, the presence marking must be switched on through operation of the presence button or through automatic logging. The presence button must be green; the state of the switch must be indicated optically within the button or next to it. The button should be positioned near the door/patient console. The presence button – if there is one – for a second group of personnel may be yellow.

2.7.5 CALL CANCELLATION

Termination of the call state by setting of marked presence by means of a cancel button or by remote answering within the framework of the permissible options.

2.7.6 CALL ANSWERING

Reaction to a call through the setting up of speech communication with the caller. Call answering can take place via different answering locations.

2.7.7 EMERGENCY CALL

It is a Call made by a Healthcare provider, when assistance from another Healthcare provider is summoned, call being made from the call equipment located by the bed, and the call can be selectively recognised to the point of its origin.

The release of an emergency call is prepared by switching on presence. The call in the room becomes an emergency call.

2.7.8 BATHROOM CALL

Call from a Bathroom or Toilet or PHT (Physical Handicap Toilet) or from other rooms that cannot be looked into from the outside. The call must not be deleted by the marking of presence if the call release location cannot be looked into from the outside. So, in case of private rooms, bathroom call may be cancelled from the patient console.

2.7.9 MONITORING/DIAGNOSTIC CALL

Automatically released emergency call from a monitoring device. The number of sockets per bed should be specified with the operator.

7.7.10 CALL FORWARDING

Forwarding of a call to the location where presence has been marked by the care personnel. The call is acoustically indicated as a minimum. In addition, the call location and the call type can be indicated. Answerable calls may be cancelled after a speech connection. Call forwarding is required when the call system is used in de-centralised mode and the duty location is not occupied. Activation occurs automatically as soon as the duty place is not occupied.

2.7.11 BEDHEAD SERVICES

Facilities provided for patients and/or staff to enable the performance of clinical and patient non-clinical functions at in-patient locations. They can consist of low-voltage electrical supplies, extra low-voltage communication systems (for example nurse call and IT systems), entertainment, monitoring facilities and medical gas outlets.

2.7.12 CODE BLUE CALL (DOCTOR CALL)

A distinctive audible and visual signal representing a life-threatening situation that requires immediate action. Where the presence is set by a care staff, a doctor call can be released by pressing the doctor call button. A doctor call button triggers a call, addressed to the medical staff. Regardless of the set presence, one of the following calls can be released: Doctor call (green presence + doctor call button).

2.7.13 DISCONNECTION CALL

Call automatically released when disconnecting a patient handset. The call must be acknowledged by connecting the patient handset and carrying out a subsequent function test (actuation of the flashing call button).

2.7.14 REMINDER CALLS

Deactivates the active display of individual calls for a specific period of time. Reminders can be called up via special devices, e.g. answering units. After expiry of the predefined period, the reminder is terminated and the call will be displayed in the system again. Reminders may only be set if a speech connection has been established with the caller and the caller has been consulted.

2.7.15 SERVICE CALL

Triggers a service call, addressed to the service staff. Service staff means carrying out more basic activities without care measures.

2.7.16 LOCATING (FINDER) AND REASSURANCE LIGHT

Small LED for locating buttons and indicating the status of the relevant function. The LED displays a permanent faint glow and will lighten up when the relevant button has been pressed its function has been activated (e.g. call buttons). The LED will not go out when the same button is pressed again, as repeat pressing will not deactivate the function (e.g. a call will remain active even when the call button is repeatedly pressed). The LED will stop shining brightly when another button is pressed, cancelling the released function (e.g. pressing the corresponding presence button will deactivate the call and the LED of the call button will return to a faint glow).

2.7.17 EVENT DATABASE SOFTWARE FOR REPORT GENERATION

System extension for the automatic logging of call system events, e.g. calls, presences, reminders, etc. The software and the recording run centrally on the Management Center of the call system. The data can be inspected and analysed via a web interface. Analyses can be exported as PDF, Excel and CSV files.

2.7.18 MAIN SERVER (MANAGEMENT CENTER)

The server acts as the centralised node for all kinds of external systems and takes over key functions for the entire call system. The Management Center is connected with the local switches/ controllers via the network of backbone switches. Depending upon site requirement, Management Center can be hardware redundant also.

2.7.19 CONTROL UNIT

Control device that administers and controls the processes of a Nurse Call System and in which, as a rule, control programs are stored.

2.7.20 CORD SET, HAND-HELD NURSE CALL ONLY UNIT

It is a hand-held unit, with a Call-Button, used solely for patient–nurse call purposes. It is used in patient rooms and other areas where priority calls require immediate and emergency attention. Device meant for the patient, with call button, reassurance lamp, light buttons and, where applicable, other operational elements. It is used as an integrated unit or handset for the reception of radio and TV programmes and all elements for speech connection to care personnel.

For handsets, a bracket (cradle) should be planned for the wall and/or bedside table. Also a clip to attach handset with bed is also recommended to avoid fall of handset from bed.

2.7.21 CORRIDOR INDICATOR LAMP

A light with call lamp (red) and presence indicator (green) allocated to and in close proximity to the room (usually near or above the entrance to the room). A corridor indicator lamp with a red luminous field (calls) and green luminous field (presence) must be provided in the corridor area above or next to the entrance to each room. Additional illuminated fields (white, yellow) for further presences and for additional information are permissible.

2.7.22 DIRECTION LAMP

Lamps, which combine the displays of several corridor indicator lamps, in order to direct personnel to parts of the building that are not immediately visible. The call information of several rooms can additionally be indicated collectively in zone, care groups and direction lamps.

2.7.23 ZONE INDICATOR LAMP

Lamp allocated to a ward for collective indication of calls from this ward. The indication occurs thereby taking into account the call priorities in the same way as with the corridor indicator lamps. Instead of zone, care group and direction lamps, numerical or alpha-numerical displays can be used.

2.7.24 ELECTROMAGNETIC COMPATIBILITY (EMC)

Capability of electrical and electronic equipment or systems to be operated within a defined margin of safety, in the intended operational environment, at designed levels of efficiency, without degradation due to interference and so as not to cause interference to other such systems.

2.7.25 LIGHT EMITTING DIODE (LED)

A robust solid-state indicator lamp, ideal for low-powered visual display and signalling use.

2.7.26 MONITORED CALL CIRCUIT

A registered alarm call that is activated if the cord set (nurse-call handset) unit plug has been disconnected from its socket or an open circuit cable fault occurs.

2.7.27 NURSING STATION CONSOLE

It is a Desk - mounted or wall mounted console placed at Nursing Station providing complete information concerning incoming calls including patient or staff member's room location, bed location (if applicable) and call priority. The console can be configured for user coordinated functions including date & time settings, brightness, tone & volume setting etc. These functions are activated using selector buttons. Functions are customizable on an individual basis allowing each console to be programmed for its specific location and purpose. The console is continually supervised for both power and signal.

Showing each call location and for differentiating between call types within a ward and showing higher priority calls on the top. As a rule, every room and every bed can be spoken to and answered calls can be cancelled from one answering unit. General announcements, zone linking and other operational procedures are mostly organised from here.

2.7.28 SIP

Session Initiation Protocol – for the delivery of telephony services over an Internet-protocol based network.

2.7.29 STAFF COMMUNICATIONS BASE, NURSING STATION UNIT, NURSE STATION CONSOLE, NURSE STATION CONTROLLER, NURSE MASTER STATION

It is the administrative and communication centre of a clinical unit. All patient calls will need to be indicated here by audible and visible means (for example LCD or computer visual display units (VDUs)).

When required, it should be possible to attach a LED Monitor to the base and bring the information at the Nurse Station Counter.

2.7.30 SYSTEM (COMMUNICATION)

A system designed to provide transfer of information between two or more locations, either by direct wiring or by other means. The system will embrace the necessary control units and power supplies.

2.7.31 SYSTEM (ELECTRICAL)

A system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy, including such source and such equipment.

2.7.32 VoIP

Voice over Internet Protocol network for the delivery of telephony services

2.7.33 WALL OR BEDHEAD TRUNKING - MOUNTED NURSE CALL PUSH-BUTTON CONSOLE

The Nurse Call Push-button should be large enough and easily recognisable and suitable for all areas of a Hospital, where it is intended to be used. It shall be red coloured and must give a reassurance LED & finder LED.

2.8 MAKE IN INDIA POLICY

The Nurse Call System work shall fully comply to Public Procurement (preference to make in India) Order (PPP-MII order) 2017 issued by DPIIT and corresponding notifications issued by concerned nodal ministry/department as amended up to the last date of receipt of tenders.

CHAPTER 3

NURSE CALL SYSTEM- TECHNICAL SPECIFICATIONS

3.1 TECHNICAL SPECIFICATIONS OF EQUIPMENT

3.1.1 A typical Basic NCS essentially consist of the following. There can be more add on units in advanced systems. Since this specification is for a basic NCS, technical specifications for the following are provided:

- (i) Main Controllers/ IP Controllers /System switch
- (ii) Nurse Station Terminal
- (iii) External Large LCD Display at Nurse Station or Corridors Display
- (iv) Small Nurse Station/ Duty Room Station
- (v) Patient Handset without voice facility with Connection Module/ Bed Head Unit – for Wards/ Multiple bedded rooms:
- (vi) Patient Hand set with voice facility with connection module/Bed Head unit: for private room only –Single/Double Bed room/Suite Room/VIP Room
- (vii) Patient call-cancel button without handset – (for remote area hospital, where safety of handset is an issue/ less requirement/ attended is always available)
- (viii) Pull cord unit for WC/ Bath area.
- (ix) Lamp Module/ Zone Light/ Directional Light: Outside room/ ward
- (x) Doctor Call & Cancel Button (Code Blue):
- (xi) Room terminal with LC display– For Private Rooms
- (xii) Nurse Call Server
- (xiii) Backbone / Network switches
- (xiv) Central Monitoring Station with event database software
- (xv) Integration with IPBX System

3.2 MAIN CONTROLLERS/ IP CONTROLLERS/SYSTEM SWITCH

Controller shall be IP based & all the nurse station/ patient handset & other equipment shall be connected to main controller through CAT 6 cable through RJ45 connection port. Main controllers shall be networkable with other controllers. Fault in one controller shall not have the effect on the working of another controller. Each controller shall be able to work independently in case of a problem in network. Apart from controller, other devices in the room/ toilet/ outside room/ nurse station/Lamp module shall be POE based. Controller shall be wall mounted or rack mounted as per site requirement. For decentralised operations, one controller shall not be connected to more than 20 Rooms/ 30 beds.

3.3 NURSE STATION TERMINAL

Nurse station shall be IP Based and have large LC display minimum 7” (Minimum 4 calls can be displayed at a time in LC display) capable of showing multiple patient call at a time with bed/ ward no. & type of call. There shall be scroll down feature as well in case no. of patient call increase at a given time i.e. there shall not be any chance of missing any patient call. There shall be feature to priorities patient call depending upon patient condition, type of call & location (Bed or WC). Nurse station shall have voice facility. It shall be user friendly & have good aesthetic looks. All Nurse Stations shall be networked with other nurse station with facility of call forwarding/ diverting/ escalating calls in between nurse station. Nurse station shall be programmable so that emergency calls shall always be on top priority. Nurse Station shall have inbuilt sounder having volume & tone adjustment. Nurse station shall have other settings also like brightness control, multiple tones to adjust tone as per type of call, fault or failure indication etc. It must be POE based & shall not require separate power cable/ power supply. The important functions are:

- Displays date and time
- Permanent indication of the quantity of calls, reminders and occurring faults, outstanding at the time
- Displays all presences that are marked, depending on staff category listed on a desk (in the corresponding colours in accordance with VDE 0834/ UL/ Health Technical Memorandum 08-03: Bed head services based nurses call systems and with a unique symbol),
- Displays all calls with their relevant colours in accordance with VDE 0834/ UL/ Health Technical Memorandum 08-03: Bed head services based nurses call systems and clear symbols for each type of call,
- All call indications are automatically shown in accordance with the priorities for indication which are stored in the system, starting with the highest priority call:
- The following information must be able to be imparted in this case: the exact type of call

with information about the bed number or WC call, doctor call etc. the exact call location with information about the individual room name and the care group to which it might have been assigned to.

- For calls across more than one ward the relevant ward name must also be indicated.
- Emergency calls must always be shown flashing,
- Colour graphic LC display, for displaying all details
- Integrated SIP VOIP telephone
- A smash-resistant glass panel placed in front of the display,
- Microphone and loudspeaker for hands-free speaking (incl. volume adjustment)

Note: *The main nurse station is mandatory to be used with speech system so that nurses can attend voice call from patient handset.*

3.4 EXTERNAL LARGE LCD DISPLAY AT NURSE STATION OR CORRIDORS DISPLAY

For large nurse station counter, there shall be external LCD/ LED connected with nurse call system to display the calls on external larger screen of minimum 20” so that nursing staff can see the incoming call including details like type of calls, bed no., ward etc. from long distance.

The monitor may be mounted on wall or hung from ceiling using standard accessories as per site requirements. The external monitors are standard monitors & existing monitors in the hospital can be used subject to compatibility of input/output ports etc.

Note: *There shall be option to use either main nurse station or external large display or both on single nurse station terminal as per client/ hospital requirement. For without speech system & large nurse station, hospital may require wall mounted external large LCD instead of main nurse station for easy viewing.*

3.5 SMALL NURSE STATION/DUTY ROOM STATION

The wards having few nos. of beds (Max. 10 beds) & having nurse station counter inside the ward only like Pre-OP/ Post Op/ Triage/ recovery room etc., a small nurse station having smaller LC display showing pin point location of call shall be used. The Nurse Station shall have voice facility as well as scrolling function to see multiple calls, if any.

- Whenever the patient needs the attention of any “Nurse”, patient just press the button provided at his/ her bedside.
- 1 call button (red with nurse symbol) including a finder/reassurance light,
- 1 presence/ cancel key (green) including control LED - Green colour button must be programmable to use as presence button as well as call cancel button. It shall be possible to

generate emergency staff call by pressing presence button + Call button. Emergency staff call must be locked with presence button to avoid false emergency call.

- Moisture protected
- Fungicidal membrane keypad
- Interfaces/system connection: 2 × RJ-45 sockets for connection
- Protection class: IP 44, VDE 0834 Environmental class II/ UL/ Health Technical Memorandum 08-03: Bed head services based nurses call systems

3.6 PATIENT HANDSET WITHOUT VOICE FACILITY WITH CONNECTION MODULE/ BED HEAD UNIT – FOR WARDS/MULTIPLE BEDDED ROOMS

Whenever the patient needs the attention of any “Nurse”, patient just press the button provided at his/ her bedside in the patient handset. On pressing the button, the alarm shall annunciate at the Nurse Station by local sounder informing the nursing staff about the bed no. / Room no. with customized text along with type of call (Bed call or WC call or Doctor call) for their necessary action. Patient handset shall have call button and shall be connected to bed head unit through plug in cable. For safety reason, handset shall have antimicrobial/ antifungal coating to avoid infection transfer, shall be shock & spill proof and have suitable color & symbol for nurse call button on the handset. The patient handset shall have connection cord to connect with connection module. There shall be programmable Call button, Nurse Presence, Cancel and emergency button available in the room. The finder light & reassurance light should be available on patient handset & bed head unit to assure patient that call has been generated after the call button is pressed. The Nurse Presence, cancel button or doctor call button should not be available on patient handset to avoid the self-cancellation by patient or confusion to the patient. The patient handset shall have min. 2.8 meter cord and also have 2 nos. lighting buttons to integrate with electrical devices if required.

The bed head unit must have diagnostic port also to connect/ integrate with 3rd party medical devices to take their input in nurse call system to generate the call automatically as per requirement on the basis of input received from the 3rd party medical devices.

Protection class: IP 54, VDE 0834 Environmental class III VDE0834/UL/Health Technical

Memorandum 08-03: Bed head services based nurses call systems

Ambient temperature: 0 °C to +40 °C

Relative air humidity: up to 95 % without condensation Cable: 2.8 m with 200 N strain relief (relating to the device)

3.7 PATIENT HANDSET WITH VOICE FACILITY WITH CONNECTION MODULE/ BED HEAD UNIT: FOR PRIVATE ROOM ONLY – SINGLE/ DOUBLE BED ROOM/SUITE ROOM/VIP ROOM

Patient handset shall be directly on IP with VOIP feature & having dial pad like IP telephone.

Patient handset shall be connected to whenever the patient needs the attention of any “Nurse”, patient just press the button provided at his/ her bedside. On pressing the button, the alarm shall be enunciated at the Nurse Station informing the nursing staff about the bed no. / Room no. along with type of call (Bed call or WC call or Doctor call) for their necessary action. Patient handset shall have call button (red color button/indication with nurse symbol) and shall be connected to bed head unit through plug in cable. The patient handset shall have connection cord to connect with connection module. There shall be “Voice over IP” speech facility in both patient handset & nurse station with suitable inbuilt microphone & speaker. Patient handset shall have necessary keypad to dial nos. for intercom or Local/ STD calls as permitted by the hospital. Nursing staff shall receive the call from nurse station itself & respond to the patient queries. It will reduce the nurse staff movement to patient room. However, if required, nurse staff shall visit the patient room as & when needed by patient. Patient handset shall be connected to bed head unit through plug in cable. For safety reason, handset shall have antimicrobial/ antifungal coating to avoid infection transfer, shall be shock & spill proof and have suitable color& symbol for nurse call button on the handset. The finder light & reassurance light should be available on patient handset. The Nurse Presence, cancel button or doctor call button should not be available on patient handset to avoid the self-cancellation by patient or confusion to the patient. The patient handset shall have min. 2.8 meter cord and also have 2 nos. lighting buttons to integrate with electrical devices if required.

The bed head unit shall have diagnostic port also to connect with 3rd party medical devices to take their input in nurse call system to generate the call automatically as per requirement on the basis of input received from the 3rd party medical devices. Also, additionally there shall be service call button also to generate call for ward boy/ toilet assistance.

Headphone's socket: 3.5 mm jack plug

Infrared receiver: 36 kHz receiver for RC5 signals

Display: Fully graphic LC display (128 × 64 pixels) with backlight Protection class: IP 54, VDE 0834 Environmental class III / UL/ Health Technical Memorandum 08-03: Bed head services based nurses call systems.

Ambient temperature: 0 °C to +40 °C

Relative air humidity: up to 95% without condensation Cable: 2.8 m with 200 N strain relief.

3.8 PATIENT CALL-CANCEL BUTTON WITHOUT HANDSET – (FOR REMOTE AREA HOSPITAL, WHERE SAFETY OF HANDSET IS AN ISSUE/ LESS REQUIREMENT/ATTENDANT IS ALWAYS AVAILABLE)

Patient call cancel button with membrane keypad consisting of,

- 1 call button (red with nurse symbol) including a finder/reassurance light,
- 1 presence key (green) with a control LED
- 2 RJ45 sockets for connecting the data circuits including a mounting frame for screw less attachment to an installation case

3.9 PULL CORD UNIT FOR WC/BATH AREA

3.9.1 PULL CORD CALL HAVING PRESENCE & CANCEL BUTTON: FOR DETACHED/COMMON TOILET, PHYSICALLY HANDICAP TOILET

3.9.1.1 There shall be nurse call button with suitable length (min. 2.8 meter) of pull cord with color/ symbol for nurse call from the toilet. It shall be installed above shower head preferably in such a way to access from bath area as well as WC. Pull cord shall be detachable & replaceable without changing the unit for hygiene reason. The buttons shall be moisture protected & suitable for bath areas.

3.9.1.2 Interfaces/system connection: 2 × RJ-45 sockets for connection

3.9.1.3 Protection class: IP 44, VDE 0834 Environmental class II

3.9.1.4 Intended for use in wet rooms

3.9.1.5 Integrated locating and reassurance light

3.9.1.6 Actuating the pull cord has the same effect as pressing a call button (red)

3.9.1.7 Fast-exchange pull cord (approx. two meter) with snap hook

3.9.1.8 Red grip with nurse symbol

3.9.1.9 Germ inhibiting membrane keypad

3.9.2 PULL CORD CALL BUTTON FOR ATTACHED WC (FOR PRIVATE ROOMS)

3.9.2.1 There shall be nurse call button with suitable length (min. 2.8 meter) of pull cord with color/ symbol for nurse call from the toilet. It shall be installed above shower head preferably in such a way to access from bath area as well as WC. Pull cord shall be detachable & replaceable without changing the unit for hygiene reason. The buttons shall be moisture protected & suitable for bath areas.

3.9.2.2 Interfaces/system connection: 2 × RJ-45 sockets for connection

3.9.2.3 Protection class: IP 44, VDE 0834 Environmental class II

3.9.2.4 Intended for use in wet rooms

3.9.2.5 Integrated locating and reassurance light

3.9.2.6 Actuating the pull cord has the same effect as pressing a call button (red)

3.9.2.7 Fast-exchange pull cord (approx. two meter) with snap hook

3.9.2.8 Red grip with nurse symbol

3.9.2.9 Germ inhibiting membrane keypad

3.10 LAMP MODULE/ ZONE LIGHT/ DIRECTIONAL LIGHT: OUTSIDE ROOM/ WARD

3.10.1 Lamp module shall be POE based, shall not require separate power cable/ power supply & installed outside the room/ ward above the door for visual indication of different type of call. There shall be 5 different colour (white, red, blue, yellow, green) section in the lamp module for indication of different type of calls.

Once the patient annunciates the alarm, the signal shall go to the nurse station. The lamp outside the patient room/ ward shall also glow simultaneously red providing a visual alarm. Lamp shall have different colours light to inform about the type of call like red light for bed call, blue light for code blue call, green light for nurse presence, white light for WC call, yellow light for other services.

- Lighting intensity: max. 2500
- Brightness: Lux 250 cd per m² to 750 cd per m²
- Interfaces/system connection: 2 × RJ-45 sockets for connection

3.11 DOCTOR CALL & CANCEL BUTTON (CODE BLUE):

3.11.1 Each ward/ room shall have one code blue button (Doctor Call) having doctor call & doctor presence & Doctor call cancellation button. Doctor call button shall be used only by nurse staff & programmed in such a way to avoid direct code blue call by patient. It shall be a separate programmable button with presence & cancel button. It shall not be in patient handset with nurse call button & shall have separate presence & cancel button. Once nurse press code blue button, call shall go to every nurse station of the hospital or as programmed as per site requirements with room no. & bed no. information so that code blue team available at any nurse station shall be informed & they can reach the patient room on immediate basis.

- Interfaces/system connection: 2 × RJ-45 sockets for connection
- Protection class: IP 44, VDE 0834 Environmental class II

3.12 ROOM TERMINAL WITH LC DISPLAY–FOR PRIVATE ROOMS

3.12.1 The room terminal should be installed in each private room having patient handset with speech facility. The room terminal shall have Membrane keypad for operation, comprising of:

- Call button (red with nurse symbol) with integrated finder and reassurance light
- Doctor call button (blue with doctor call symbol) with integrated reassurance light,

- Nurse Presence & cancel button (green) with control LED,
- Doctor Presence & cancel button (blue for the doctor) with control LED,
- LC Display
- Room terminal shall display the nurse call from other rooms/ patients, in case nurse acknowledge the call from room terminal.

3.13 NURSE CALL SERVER:

3.13.1 Server used during the commissioning of the system for reading in the system topology, for uploading the firmware and the system configuration, for operating interfaces to foreign systems, for logging of all system events and as a central location for system configuration and remote maintenance. The system must consist of:

- All necessary software and hardware for handling the complete nurse call system and all beds call points.
- It should support the redundant architecture as a optional feature
- 1 x 1000 base -TX LAN port for connecting in to Customer LAN Network
- 1 x 1000 base - TX LAN Port as a back-end service port
- It should support the additional mini server architecture if system has a more than 1 VLAN
- 4 x 1000 base -TX LAN ports for further extending the Nurse Call Network-Pre-soaked System Software
- 2 x DB 9 serial connection for Interface
- 2 x USB Ports
- Three status LEDs serve for indication of the operative states. A reset button is also located on the front.
- Suited for 19 inch 1 HE/HU Network Rack Size

3.14 BACKBONE / NETWORK SWITCHES:

3.14.1 This switch is used to connect the system server to the communications network, for connecting all the other servers and foreign systems to be connected to the network, which exchange data with the network via an IP interface. Furthermore, backbone switches are also to be used for bridging large distances between the individual servers, foreign systems and peripheral modules. General requirements for all the types should be as per manufacturer recommendation and it should be minimum layer 2/ 3 Switch with DTP and VLAN trunking layer 2 protocol.

The system shall be able to use hospital existing backbone switches also or same make as other hospital backbone switches to have better warranty & maintenance support.

3.15 CENTRAL MONITORING STATION WITH EVENT DATABASE SOFTWARE

3.15.1 Complete nurse call system shall be centrally connected to a PC having a software recording of all the different type of call & cancel with date & time. The vendor needs to consider server/ back bone / network switches etc. As the nurse call system is on IP, it

should work on client existing LAN infrastructure as well, if required without any additional charges/ software/ license. However, servers for nurse call system shall be supplied & configured by the OEM only. The software shall record the date & time of call generated by patient & call presence & cancel by nurse with type of call. Software shall be able to generate report on real time basis as per requirement. It shall also be possible to put reminder/ highlighted on calls if nursing staff do not attend/ cancel the patient call with in specific time decided by the hospital management. The fault in central monitoring station shall not affect the working of nurse call system in the hospital. The software shall show the pin point address & location of any fault in the system like any fault in cable or any nurse call module. The software shall be for life time & there shall not be any separate license charges later on.

3.16 INTEGRATION WITH IPBX SYSTEM

- 3.16.1 The nurse call system shall be integrated with hospital IPBX system through SIP protocol. The nurse station & patient handset with speech shall have their dedicated IP so that both can be used as IP telephone. There shall be dial pad in nurse station & patient handset with speech to make call to intercom, or mobile phone/ STD etc. as permitted in the IPBX system.

CHAPTER 4

COMPREHENSIVE MAINTENANCE OF NURSE CALL SYSTEM

- 4.1 The contractor shall be responsible for defect liability, OEM warranty of products and comprehensive maintenance of Nurse Call System installations for 10 (ten) years from the date of completion of the work through the same Nurse Call System firm. The Nurse Call System firm shall be approved on the basis of work experience as per provisions of eligibility described in the CPWD Works Manual/ Chapter 1 para 4 of this specification. The comprehensive maintenance of Nurse Call System installations includes complete Nurse Call System installations, labour, spares, all consumables and filters etc. as required including the following:
- 4.1.1 All Nurse Call System.
 - 4.1.2 Plastic and glass parts against any manufacturing defects.
 - 4.1.3 All kinds of sensors.
 - 4.1.4 All kind of coils, probes and transducers.
 - 4.1.5 Printers and imagers including laser and thermal printers with all parts.
 - 4.1.6 UPS including the replacement of batteries.
 - 4.1.7 Preventive maintenance including testing & calibration as per technical / service / operational manual of the manufacturer.
 - 4.1.8 In the case of Nurse Call System equipment, the comprehensive maintenance shall be done with back-to-back support from OEM. In such cases, authorized agent of OEM shall reach the site within 8 hours of raising a service call.
 - 4.1.9 The Nurse Call System firm shall ensure uninterrupted service without compromising functioning of Nurse Call System/ICU.
 - 4.1.10 The Nurse Call System firm shall set-up a maintenance base in the vicinity of the hospital, to provide maintenance service of the entire Nurse Call System installations.
 - 4.1.11 If the performance of any individual equipment or system is not satisfactory, the same shall be replaced free of cost.
 - 4.1.12 If it is found that to meet the performance criteria, any extra equipment is required, the same shall be provided free of cost.
 - 4.1.13 Any lacunae noticed in the functioning of the installation as a result of any design fault shall be rectified free of cost.

- 4.1.14 Proper marking has to be made for all spares for identification like printing of installation and repair dates.
- 4.1.15 On receipt of any complaint, the Nurse Call System firm shall, within 8 hours on a 24(hours) X 7 (days) X 365 (days) basis respond to take action to repair or replace the defective goods or parts thereof free of cost. The Nurse Call System firm shall take over the replaced parts/goods after providing their replacements and no claim, whatsoever shall lie on the hospital/institute for such replaced parts/goods thereafter. The penalty clause for non-rectification will be applicable as per tender conditions.
- 4.1.16 Upon failure of the Nurse Call System firm to respond to take action to repair or replace the defect(s) within 8 hours on a 24(hours) X 7 (days) X 365 (days) basis, the hospital/institute may proceed to take such remedial action(s) as deemed fit by the department/ hospital/ institute, at the risk and cost of the contractor without prejudice to the Right of Government to take other remedial actions under the agreement.
- 4.1.17 If the Nurse call system firm fails to attend the complaint within 8 hours, a penalty of Rs. 2000/hour will be charged from the firm and recovery made accordingly. The decision of the Engineer-in-Charge shall be final and binding on the firm with respect to the imposition of overall penalty decision taking into view overall circumstances of the case.
- 4.1.18 The payment of comprehensive maintenance will be made on six monthly basis after satisfactory completion of said period duly certified by end user.
- 4.1.19 The contractor shall ensure regular updates of newer technology as and when evolved during warranty period for all the equipment.
- 4.1.20 The contractor shall deposit performance guarantee @ 3% of the value of the comprehensive maintenance contract before commencement of comprehensive maintenance, which shall be held by the hospital/institute/ department till completion of comprehensive maintenance period. Supplementary agreement can be drawn for the purpose of CAMC, after completion of the defect liability.
- 4.1.21 There shall be no extra cost for software upgradation/ supply and installation of security patches/ lifetime license fee for system. The software upgradation including security patches shall be provided free of cost during the CAMC period. Bidder should submit OEM certificate to the effect that the software as well as security patches etc. shall be made available for enabling free upgradation of the system till the expiry of the defect liability period and CAMC period. The software validity shall be till the end of the CAMC period and will be got done by the OEM/through their authorised channel partners within the tendered cost.

CHAPTER 5

SAMPLE BOQ OF NURSE CALL SYSTEM

*Applicable only for standalone Nurse Call System work to be executed in existing building. Following is the Sample BOQ for nurse call system. However, items and quantities of BOQ may be derived as per individual site requirements:

Sl. No.	DESCRIPTION	UNIT	QTY	UNIT RATE	AMOUNT
A	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03-Main Controllers/ IP Controllers /System switch suitable for the proposed Nurse Call System with following features:</p>	Nos.			
	<p>The IP controller with decentralised communications node for exchanging data between the connected system devices and the rest of the communications system, consisting of necessary IP port/RJ45 port connected with CAT 6 Cable through power supply shall be POE based:</p> <ul style="list-style-type: none"> - Standard IT RJ45 socket, 100Mb IP Port, galvanically isolated conforming to UL/ EN 60950 and VDE 0834/ Health Technical Memorandum 08-03: - Necessary standard IT RJ45 sockets, each for a 100Mb IP system port for connecting all IP capable system modules; - Necessary standard IT RJ45 socket, 100Mb IP Port for connecting nurse station as well as control panel PCs or for redundant Connection. 				
B	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified /Health Technical Memorandum 08-03- Main Nurse station terminal capable of serving multiple call at a time with following features.</p>				

	<p>-IP based 7 inch large LCD/TFT display</p> <p>- DVI or HDMI output with inbuilt sounder to display nurse call on external monitor.</p> <p>Module shall contain:</p> <ul style="list-style-type: none"> • Connection of 2 DVI/ HDMI monitors, in case double side display required. • DVI or HDMI sockets for standard monitors with DVI/ HDMI input connection (computer TFT/LCD/ flat screen monitor) or a HDready TV. For TV devices without DVI input, a passive DVI / HDMI coupler can be used. • Built-in piezo buzzer for call signaling • Scrolling feature shall be available • LAN interface: RJ45 socket, 100Base-TX interface 	Nos.			
C	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03: External Large LCD Display at Nurse Station or Corridors Display with following features</p>				
	<p>Minimum 32" LCD/ LED standard monitor of reputed make with necessary wall mounting accessories having DVI or HDMI input port.</p>	Nos.			
D	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03- Small Nurse/Duty Room Station with following features</p>				
	<p>Suitable for upto 10 beds & having nurse station counter inside the ward only like Pre-OP/ Post Op/ Triage/ recovery room etc., having smaller LC display showing pin point location of call. The Nurse Station shall have voice facility as well as scrolling function to see multiple calls, if any.</p>	Nos.			
E	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03 -Patient Handset without voice facility with Connection Module/ bed head unit – for</p>				

	<p>wards/multiple bedded rooms with following features:</p> <p>Having provision for press button to call Nurse and handset shall have antimicrobial/ antifungal coating to avoid infection transfer, shall be shock & spill proof and have suitable color & symbol for nurse call button on the handset. The patient handset shall have connection cord to connect with connection module. The finderlight & reassurance light should be available on patient handset & bed head unit to assure patient that call has been generated after the call button is pressed. The patient handset shall have min. 2.8 meter cord and also have 2 nos. lighting buttons to integrate with electrical devices if required. Patient bed head unit shall have following:</p> <ul style="list-style-type: none"> -Auto disconnect feature to avoid damage to unit/ handset if pulled forcibly. -1 membrane keypad: -1 call button (red with nurse symbol) including afinder/reassurance light, -1 presence key cum cancel button (green) including a controlLED, -1 DIN Socket for interfacing with other medical devices <p>The connection module should be connected in ring topology. There should be no individual cable for each bed.</p>	Nos.			
F	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03 - Patient Hand set with voice facility with connection module/Bed Head unit: for private room only –Single/Double Bed room/Suite Room/VIP Room with following features</p>				

<p>Having provision for press button to call Nurse and handset shall have antimicrobial/ antifungal coating to avoid infection transfer, shall be shock & spill proof and have suitable color & symbol for nurse call button on the handset. The patient handset shall have connection cord to connect with connection module. The finder light & reassurance light should be available on patient handset & bed head unit to assure patient that call has been generated after the call button is pressed. The patient handset shall have min. 2.8 meter cord and also have 2 nos. lighting buttons to integrate with electrical devices if required. Patient handset shall have dial pad & two way speech facility. Patient handset shall be directly on IP with VOIP feature & having dial pad like IP telephone. Nursing staff shall receive the call from nurse station itself & respond to the patient queries. Patient handset shall be directly on IP with VOIP feature & having dial pad like IP telephone. Patient bed head unit shall have:</p> <p>Auto disconnect feature to avoid damage to unit/ handset if pulled forcible.</p> <ul style="list-style-type: none"> - Standard RJ45 socket marked in color and with measures to ensure that the patient handset is correctly connected, including auto disconnect mechanism, -1 membrane keypad: - 1 DIN Socket for interfacing with other medical devices - module should be connected in ring topology. There should be no individual cable for each bed. Room Terminal shall have - Electronic buzzer for acoustic call forwarding -Membrane keypad for operation, comprising of: -Call button (red colour-work as additional nurse help request) with integrated finder and reassurance light -Doctor call button (blue) with integrated finder and reassurance light, -Presence button (green) with control LED, -Presence button (blue) with control LED, 				
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G	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03- Patient call-cancel button without handset – (for remote area hospital, where safety of handset is an issue/ less requirement/ attendant is always available) with following feature:				
	Patient call cancel button with membrane keypad consisting of, <ul style="list-style-type: none"> • 1 call button (red with nurse symbol) including afinder/reassurance light, • 1 presence cum cancel key (green) with a control LED to mark presence/ cancel the call. 				
H	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03Pullcord unit for WC/ Toilet/ Bath area with following features:				
	Pull cord for WC shall consist of: <ul style="list-style-type: none"> - 1 call button (pull cord) including a finder light & reassurancelight, - 1 presence cum cancel button (green) incl. control LED, - micro switch with a 2 metre pull cord and a luminous grip with anurse call symbol, Pull cord characteristics: <ul style="list-style-type: none"> max. force at break: 120N (ca. 12 kg): for hygiene reasons it mustalso be possible to change the pull cord very easily using a snap hook; -Moisture Protected 	Nos.			
I	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03 Lamp Module/ Zone Light/ Directional Light: Outside room/ ward with following features:				

	<p>For optical indication of calls, presences and reminders in therelevant colours conforming to VDE0834 consisting of:</p> <ul style="list-style-type: none"> - 5 light chambers with light reflectors for homogeneousillumination, - 1 light chamber fitted with 3 ultra bright red LEDs, - 1 light chamber fitted with 3 ultra bright white LEDs, - 1 light chamber fitted with 3 ultra bright green LEDs, - 1 light chamber fitted with 3 ultra bright blue LEDs, - 1 light chamber fitted with 3 ultra bright Yellow LEDs, - 2 RJ45 ports for ring connectivity - the LED life expectancy is approximately 100,000 operatinghours, - should not require separate power cable for safety reason. 	Nos.				
J	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03-Doctor Call & Cancel Button (Code Blue) with following features:</p>					
	<p>1 doctor call key (blue) including a finder light / reassurance light,</p> <ul style="list-style-type: none"> - Doctor presence cum cancel button - a membrane keypad - Integrated sounder - should be connected in ring topology. 					
K	<p>Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03-Room terminal with LC display– For Private Rooms with following features:</p>					

	<ul style="list-style-type: none"> -LCD/TFT 21” Display -Call button (red with nurse symbol) with integrated finder and reassurance light -Doctor call button (blue with doctor call symbol) with integrated reassurance light, -Nurse Presence & cancel button (green) with control LED, -Doctor Presence & cancel button (blue for the doctor) with control LED, 	Nos			
L	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08- 03 Nurse Call Server with following features:				
	<p>Server for Nurse Call System for uploading the firmware and the system configuration, for operating interfaces to foreign systems, for logging of all system events and as a central location for system configuration and remote maintenance</p> <p>It should support the redundant architecture as an optional feature</p> <ul style="list-style-type: none"> - 1 x 1000 base -TX LAN port for connecting in to Customer LAN Network - 1 x 1000 base - TX LAN Port as a back-end service port - It should support the additional mini server architecture if system has more than 1 VLAN - 4 x 1000 base -Tx LAN ports for further extending the Nurse Call Network - Pre-soaked System Software - 2 x DB 9 serial connection for Interface - 2 x USB Ports - Three status LEDs serve for indication of the operative states. A reset button is also located on the front. - Suited for 19 inch 1 HE/HU Network Rack Size 	No.			

M	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03- Backbone / Network switches with following features:	Nos.			
	<p>Floor Switch:</p> <p>Uplink connections: 2 x 1Gb uplink ports, RJ45 (GBIC capable, possibility for LWL) Connections downlink: 24 x 100Mb downlinkports, RJ45 Switch must have all the Layer 2 and Layer 3 function which is mentioned in the tender Document</p>				
N	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03- Central Monitoring Station with event database software with following features:				
	<p>-Software pack installed on the system server for automatically logging all events in the entire communications system, such as, calls, presence markings, call acknowledgements, reminders.</p> <p>-This interface used Voice over IP technology in accordance with the standard H.323 or SIP and is used for telecommunications between the patient terminals and the public telephone network as well as to other in-house extensions.</p>	No.			
O	Supplying Installation, Testing and Commissioning of UL/ VDE 0834 certified/ Health Technical Memorandum 08-03-Integration with IPBX System with following features :				
	<p>-Integrated with hospital IPBX system through SIP protocol.</p> <p>-Nurse station & patient handset with speech shall have their dedicated IP so that both can be used as IP telephone.</p> <p>-Dial pad in nurse station & patient handset with speech to make call to intercom, or mobile phone/ STD etc.</p>	Nos.			

P	Supplying and laying of Cables, Conduit & accessories required in the installation in Nurse call system as per following: NOTE: The detailed quantity calculations as per site to be done for the below mentioned items.				
	a) 25 mm heavy PVC conduit (as per site requirement) ISI marked conduit	mtr			
	b) 8 core CAT6 UTP cable with necessary connectors	mtr			
	c) Fire proof two core flexible wire (ISI mark)	mtr			
Q	Comprehensive maintenance of the complete NCS installation for 5 years after completion of Defect Liability Period/Warranty Period of five years as per terms and conditions of comprehensive maintenance described in the NIT as per following:				
1.	1st year	Job			
2.	2nd year	Job			
3.	3rd year	Job			
4.	4th year	Job			
5.	5th year	Job			

Note : NIT issuing authority shall put the suitable clause to safeguard the Govt. interest against front loading of bid by the contractor

CHAPTER 6

SAMPLE COMPLIANCE SHEET FOR NURSE CALL SYSTEM

NOTE :

- The compliance sheet as given below has to be submitted by the firm at appropriate stage prior to placing of orders for the supply of goods/equipment and execution of work and has to be submitted to the department for approval.
- The firm will submit the compliance sheet in detail for each of the item along with the relevant catalogues and technical literature confirming compliance to NIT. The deviations, if any, to be categorically brought out.
- In case of non compliance of specification, the firm will be bound to offer alternate item of required specification.
- Only after approval of the same by the department, the firm will place the order and take execution of work.

S.N.	Item of Nurse Call System	As per NIT	As offered by firm	Deviation if any/Remarks
A.	Main Controllers/ IP Controllers /System switch	Make /Model/Country of origin		
		RJ45 port connected with CAT 6 Cable		
		IP based		
		POE based		
		Suitable for up to 20 Rooms/ 30 beds		
B	Nurse Station Terminal	Make /Model/Country of origin		
		IP Based and have large LC display		
		Capable of showing multiple patient call at a time		
		Having voice facility		
		Connected with other nurse station with facility of call forwarding/ diverting/ escalating calls		
		POE based & shall not required separate power cable/ power supply		

		Displays all calls with their relevant colours in accordance with UL/ VDE 0834 certified/ Health Technical Memorandum 08-03 and clear symbols for each type of call		
		Integrated SIP VOIP telephone		
C	External Large LCD Display at Nurse Station or Corridors Display	Make /Model/Country of origin		
		Minimum 32"LCD/TFT display connected for display		
D	Small Nurse Station/ Duty Room Station	Make /Model/Country of origin		
		LC display showing pin point location of call.		
		The Nurse Station shall have voice facility as well as scrolling function to see multiple calls		
		Call button (red with nurse symbol) including a finder/reassurance light provided		
		Presence/ cancel key (green) including control LED provided		
		Interfaces/system connection: 2 × RJ-45 sockets for connection		
		Protection class: IP 44, UL/ VDE 0834 certified/ Health Technical Memorandum 08-03 Environmental class II		
E	Patient	Make /Model/Country of origin		
	Handset without voice facility with Connection Module/ Bed Head Unit – for Wards/ Multiple bed rooms	The alarm shall annunciate at the Nurse Station by local sounder informing the nursing staff about the bed no. / Room no. with customised text along with type of call		
		Patient handset shall have call button and shall be connected to bed head unit		
		Handset shall have antimicrobial/ antifungal coating to avoid infection transfer,		

		Shall be shock & spill proof and have suitable colour & symbol for nurse call button on the handset		
		Programmable Call button, Nurse Presence, Cancel and emergency button available in the room		
		Minimum 2.8 meter cord and also have 2 nos. lighting buttons provided		
		Protection class: IP 54, UL/ VDE 0834 certified/ Health Technical Memorandum 08- 03: Environmental class III Ambient temperature: 0 °C to +40 °C Relative air humidity: up to 95 % without condensation Cable: 2.8 m with 200 N strain relief (relating to the device)		
F	Patient Hand set with voice facility with connection module/Bed	Make /Model/Country of origin		
		Patient handset having VOIP feature & having dial pad like IP telephone		
		The alarm shall be enunciated at the Nurse Station informing the nursing staff about the		
	Head unit: for private room only – Single/Double Bed room/Suite Room/VIP Room	bed no. / Room no. along with type of call (Bed call or WC call or Doctor call)		
		Patient handset shall have call button (red colour button/indication with nurse symbol) and shall be connected to bed head unit through plug in cable.		
		Shall be “Voice over IP” speech facility in both patient handset & nurse station with suitable in built microphone & speaker		
		Patient handset shall have necessary keypad to dial nos. for intercom or Local/ STD calls as permitted by the hospital		

		Patient handset shall have min. 2.8 meter cord and also have 2 nos. lighting buttons to integrate with electrical devices		
		Headphones socket: 3.5 mm jack plug Infrared receiver: 36 kHz receiver for RC5 signals Display: Fully graphic LC display (128 × 64 pixels) with backlight Protection class: IP 54, UL/ VDE 0834 certified/ Health Technical Memorandum 08-03: Having Environmental class III Ambient temperature: 0 °C to +40 °C Relative air humidity: up to 95 % without condensation Cable: 2.8 m with 200 N strain relief		
G	Patient call – cancel button without handset- (for remote area hospital, where safety of handset is an issue/less requirement/ attendant is always available)	Make /Model/Country of origin 1 call button (red with nurse symbol) including a finder/reassurance light,		
		1 presence key (green) with a control LED		
		2 RJ45 sockets for connecting the data circuits		
H	Pull cord unit for WC/Bath area	Make /Model/Country of origin		
		Shall be nurse call button with suitable length (min. 2.8 meter) of pull cord with colour/ symbol for nurse call from the toilet		
		Pull cord shall be detachable & replaceable without changing the unit		

		Interfaces/system connection: 2 × RJ-45 sockets for connection		
		Protection class: IP 44, UL/ VDE 0834 certified/ Health Technical Memorandum 08- 03: Environmental class II		
		Intended for use in wet rooms		
		Integrated locating and reassurance light		
		Actuating the pull cord has the same effect as pressing a call button (red)		
		Fast-exchange pull cord (approx. 2.8 meter)		
		with snap hook		
		Red grip with nurse symbol		
		Germ inhibiting membrane keypad with		
I	Lamp Module Zone light/directional light: Outside room/ward	Make /Model/Country of origin		
		Shall be POE based		
		Not required separate power cable/ power supply & installed outside the room/ ward above the door for visual indication of different type of call		
		Shall be 5 different colour (white, red, blue, yellow, green) section in the lamp module for indication of different type of calls		
		Lighting intensity: max. 2500		
		Brightness: Lux 250 cd per m ² to 750 cd per m ²		
		Interfaces/system connection: 2 × RJ-45 sockets for connection		
J	Doctor Call & Cancel Button (Code Blue):	Make /Model/Country of origin		
		Ward/ room shall have one code blue button (Doctor Call) having doctor call & doctor presence & Doctor call cancellation button		
		Interfaces/system connection: 2 × RJ-45 sockets for connection		
		Protection class: IP 44, VDE 0834 Environmental class II		

K	Room terminal with LC display– For Private Rooms	Make /Model/Country of origin		
		Call button (red with nurse symbol) with integrated finder and reassurance light		
		Doctor call button (blue with doctor call symbol) with integrated reassurance light,		
		Nurse Presence & cancel button (green) with control LED,		
		Doctor Presence & cancel button (blue for the doctor) with control LED,		
		LCD/TFT Display		
L	Nurse Call Server	Make /Model/Country of origin		
		Software and Hardware required for handling the complete nurse call system and all beds call points.		
		1 x 1000 base -TX LAN port for connecting in to Customer LAN Network		
		1 x 1000 base - TX LAN Port as a back-end service port		
		4 x 1000 base -Tx LAN ports for further extending the Nurse Call Network		
		Presoaked System Software		
		2 x DB 9 serial connection for Interface		
		2 x USB Ports		
M	Backbone/Network switches	19 inch 1 HE/HU Network Rack		
		Make /Model/Country of origin		
		2/ 3 layer Switch with DTP and VLAN trunking layer 2 protocol		
N	Central Monitoring Station with event database software	Backbone switches for bridging large distances between the individual servers, foreign systems and peripheral modules		
		Make /Model/Country of origin		
		Complete nurse call system shall be centrally connected to a PC having a software recording of all the different type of call & cancel with date & time.		

		Software shall record the date & time of call generated by patient & call presence & cancel by nurse with type of call		
O	Integration with IPBX System	Make /Model/Country of origin		
		Nurse call system shall be integrated with hospital IPBX system through SIP protocol		
		Nurse station & patient handset with speech shall have their dedicated IP so that both can be used as IP telephone		
		Having a dial pad in nurse station & patient handset with speech to make call to intercom, or mobile phone/ STD etc. as permitted in the IPBX system		

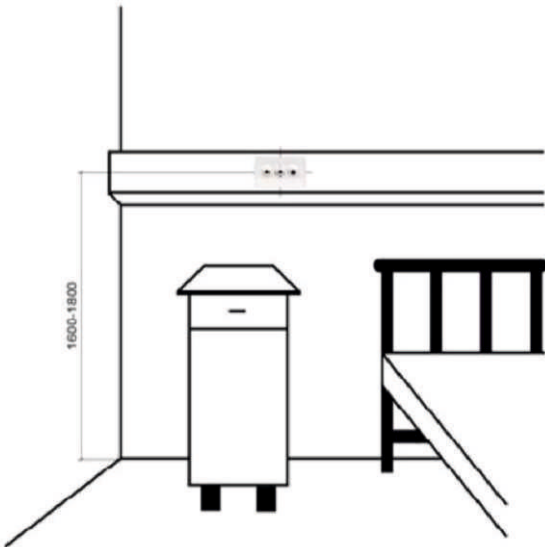
CHAPTER 7

SKETCH OF TYPICAL NURSE CALL SYSTEMS

SKETCH OF TYPICAL NURSE CALL SYSTEM SHOWING ARRANGMENT OF DIFFERENT EQUIPMENT AND ZONES

Placement of Bed Head Unit

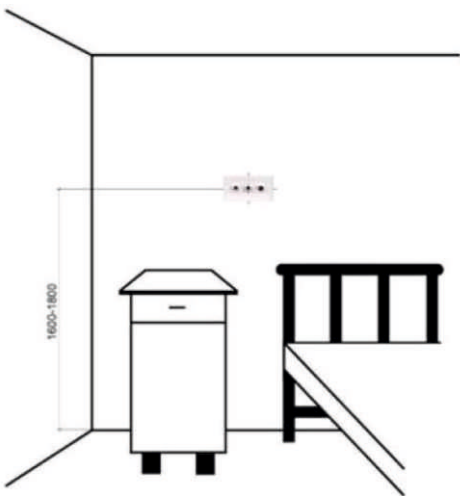
Placement of Bed Head unit (Option 1)



Connection modules for the patient terminals are mainly fitted in the media ducts (accessible from the front or from underneath depending of the type of duct used); installation is carried out by the manufacturer of the duct.

For devices housed in installation units, installation heights of 1.6 m - 1.8 m above floor level must be observed (VDE 0834, 5.4.18).

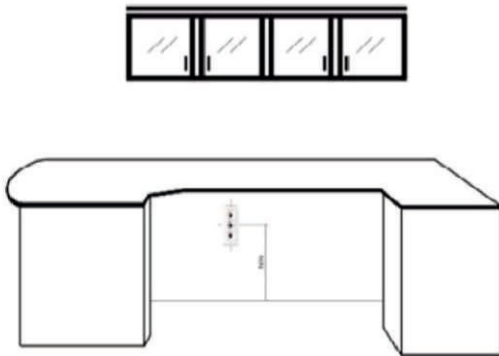
Placement of Bed Head unit (Option 2)



In the case of walls by beds with fitted cupboards, then they can be installed on this wall; the recommended place is the side of the cupboard above the bedside table.

For devices housed in installation units, installation heights of 1.6 m - 1.8 m above floor level must be observed (VDE 0834, 5.4.18).

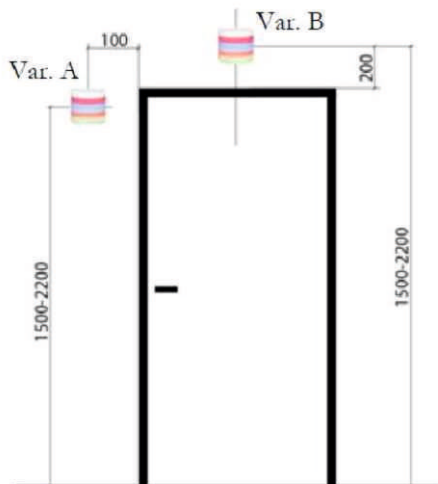
Connection Unit for Table Top Nurse Station: minimum 500 mm above floor



Since the ward terminal is normally fitted in the service room of the nurses, that connection module is to be placed in such a way that it is easily accessible for fitting and maintenance reasons.

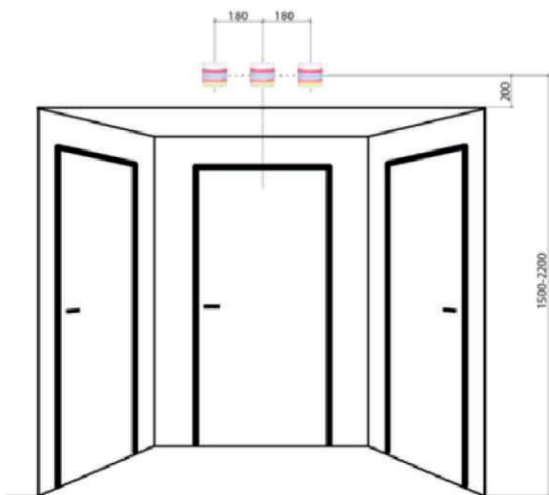
Placement of Lamp Module:

Placement of Lamp module in front of the door



Two different types of lamp modules are shown and how they are used and how the lamp module is fitted. One or the other option is to be chosen depending on the available space on site. For signal lamps and large displays, the installation height of 1.5 m - 2.2 m above floor level must be observed (VDE 0834, 5.4.18).

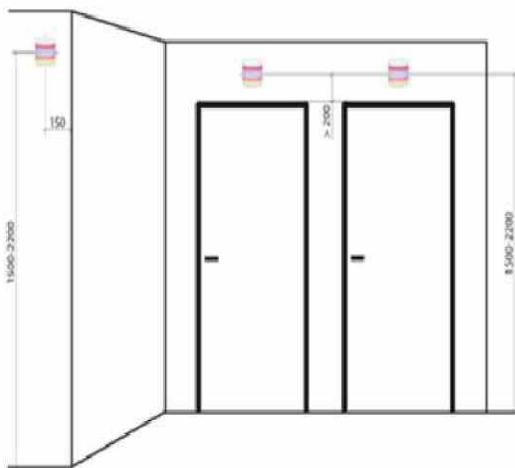
3 Placement of Lamp module for niches



A niche is shown here, behind which niche there are three doors. Due to there being three lamp modules, it is possible to recognise from outside, from which room the call is being made. If there are several rooms in this niche, then one lamp module is placed in front of every door, and a "direction guiding" module is installed on the corridor.

For signal lamps and large displays, the installation height of 1.5 m - 2.2 m above floor level must be observed (VDE 0834, 5.4.18).

Placement of Lamp module for directional guidance

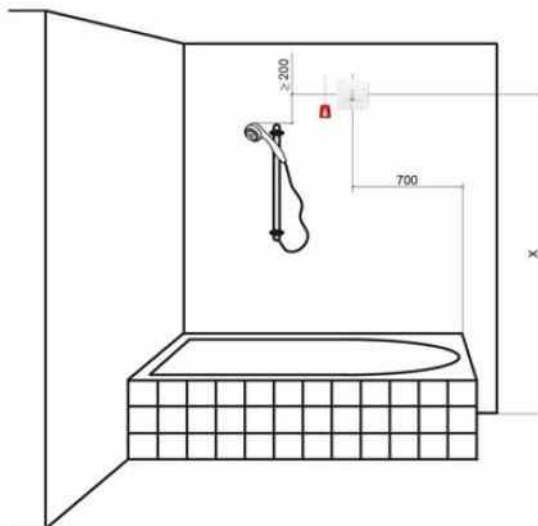


The lamp modules for the group of rooms which can not be seen from the main corridor is fitted near to the group on the main corridor, with the fitting height being adjusted based on that of the lamp modules behind the corridor.

For signal lamps and large displays, the installation height of 1.5 m - 2.2 m above floor level must be observed (VDE 0834, 5.4.18).

Placement of Pull cord in WC/ Bath area

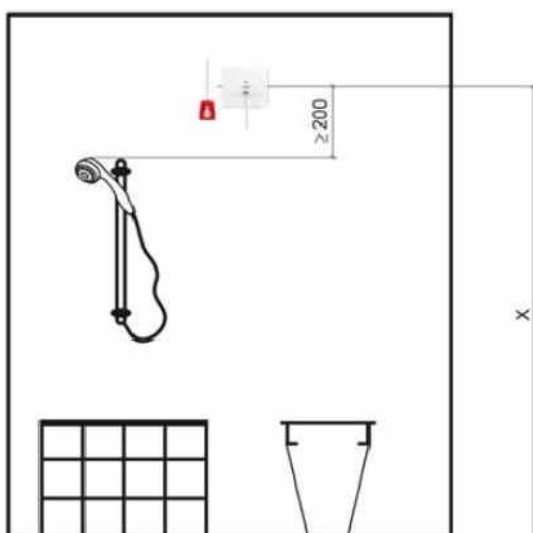
Placement of pull cord in Bathroom (Variation A)



The grip of the pull cord must be within the immediate grasp of the bather. Generally it should be possible to attach the pull button to a wall next to the bath tub. Pull buttons and similar items in shower cubicles must be fitted at least 20 cm above the highest possible position of the shower head (according to VDE 0834, 5.4.17).

If the installation is required to be conformant with ÖNORM B 1600, then the conditions regarding placement set out in this standard must be observed. Distance „X“ is dependent on the structural conditions and other applicable standards.

Placement of pull cord in Bathroom (Variation B)



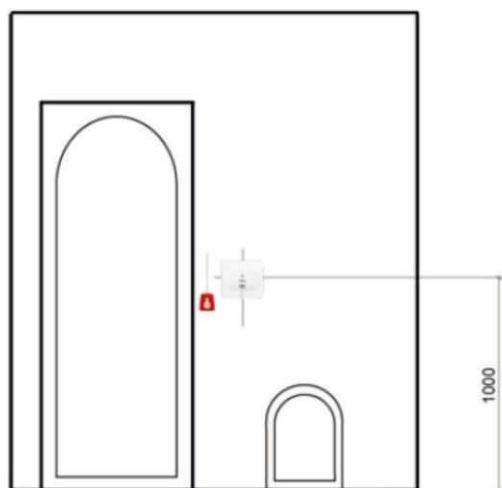
If there is a toilet (or bidet) next to the bath tub, then the pull button is to be fitted in such a way, that the grip of the cord to pull can be reached from both call locations.

Pull buttons and similar items in shower cubicles must be fitted at least 20 cm above the highest possible position of the shower head (according to VDE 0834, 5.4.17).

If the installation is required to be conformant with ÖNORM B 1600, then the conditions regarding placement set out in this standard must be observed.

Distance „X“ is dependent on the structural conditions and other applicable standards.

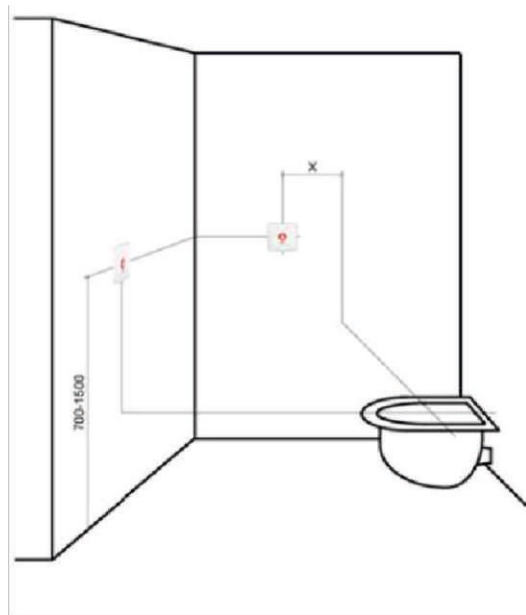
Placement of pull cord in Bathroom (Variation C)



For a free standing bathtub, it is recommended to fit the pull button on to the ceiling. If there is a toilet (bidet) next to it, then it can be fitted in such a way, that the grip of the cord to pull can be reached from both call locations.

If the installation is required to be conformant with ÖNORM B 1600, then the conditions regarding placement set out in this standard must be observed.

Placement of pull cord in Toilet (Variation D)



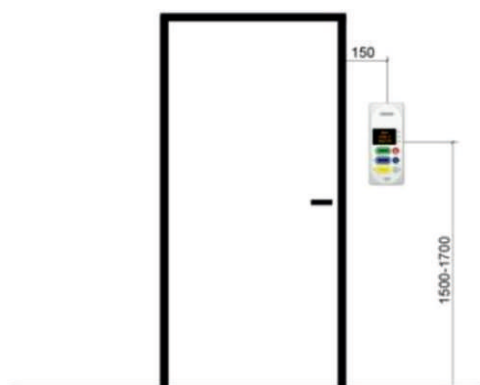
The call button should be fitted within grabbing distance and should be easily reachable. The optimal place is on the side wall or opposite the toilet.

For devices for operation (with or without light module), the installation height of 0.7 m - 1.5 m above floor level must be observed (VDE 0834, 5.4.18).

If the installation is required to be conformant with ÖNORM B 1600, then the conditions regarding placement set out in this standard must be observed.

Distance „X“ is dependent on how far the WC is from the side wall. In any case this distance should be determined so that it is possible for the patient to reach and operate the call button. If the distance is too large, then a pull button should be installed, either attached to the ceiling or on the back wall (the wall on which the WC is fitted).

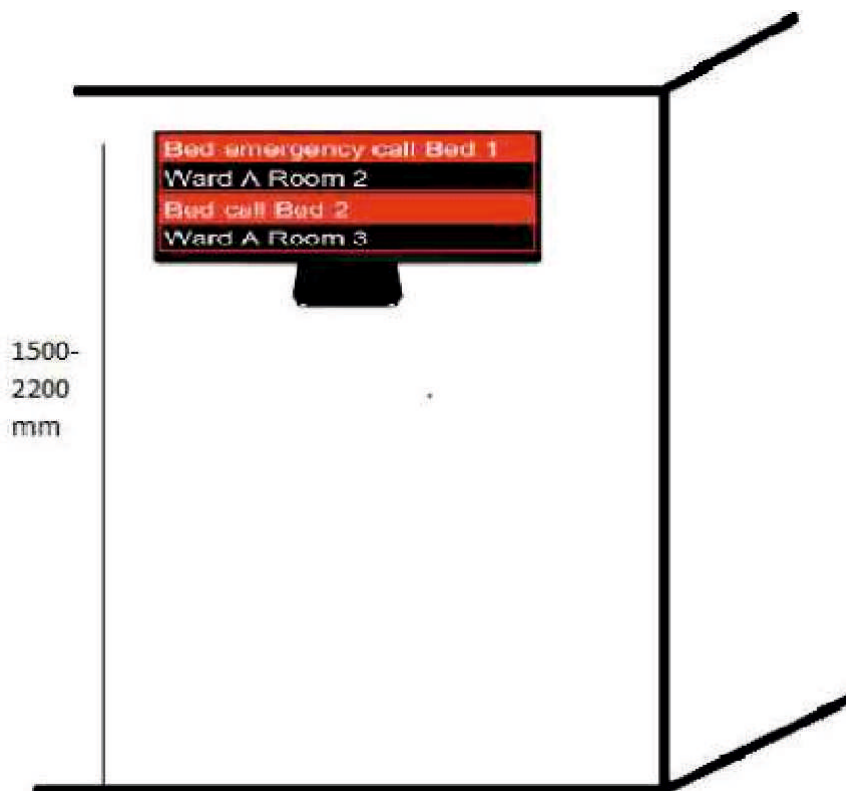
Placement of wall mounted small nurse station/ room Terminal



In this illustration the terminal is fitted next to the door. In other rooms, attention must be paid that the communications terminal is fitted within the range of sight and hearing of users of the room.

For devices for operation with text indicators, the installation height of 1.5 m - 1.7 m above floor level must be observed (VDE 0834, 5.4.18).

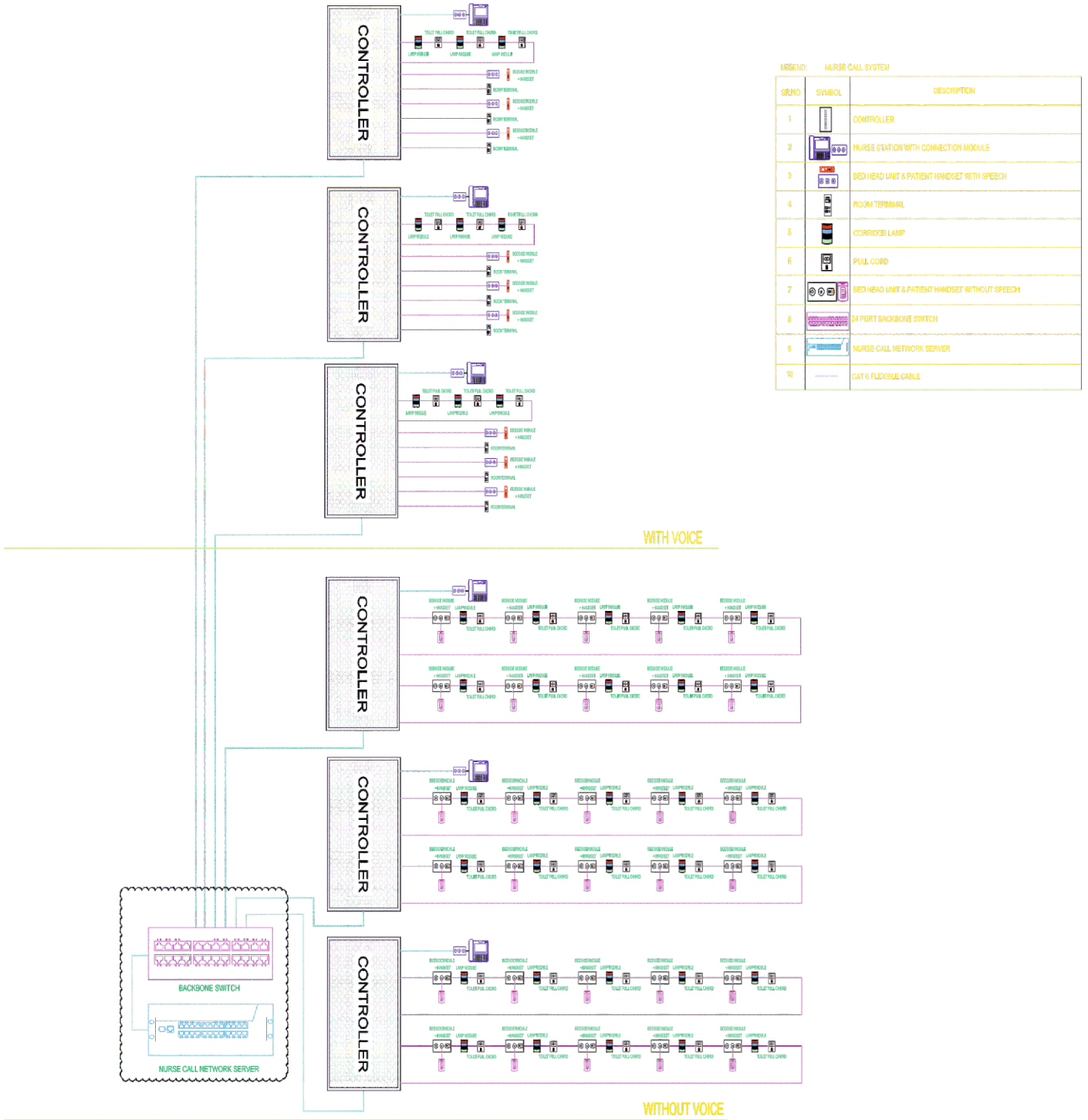
Placement of External Monitor on Wall/ Corridor



It is fitted in the most central location on the corridor (so that it is clearly visible from everywhere); in unfavourable cases two modules can be used for the group.

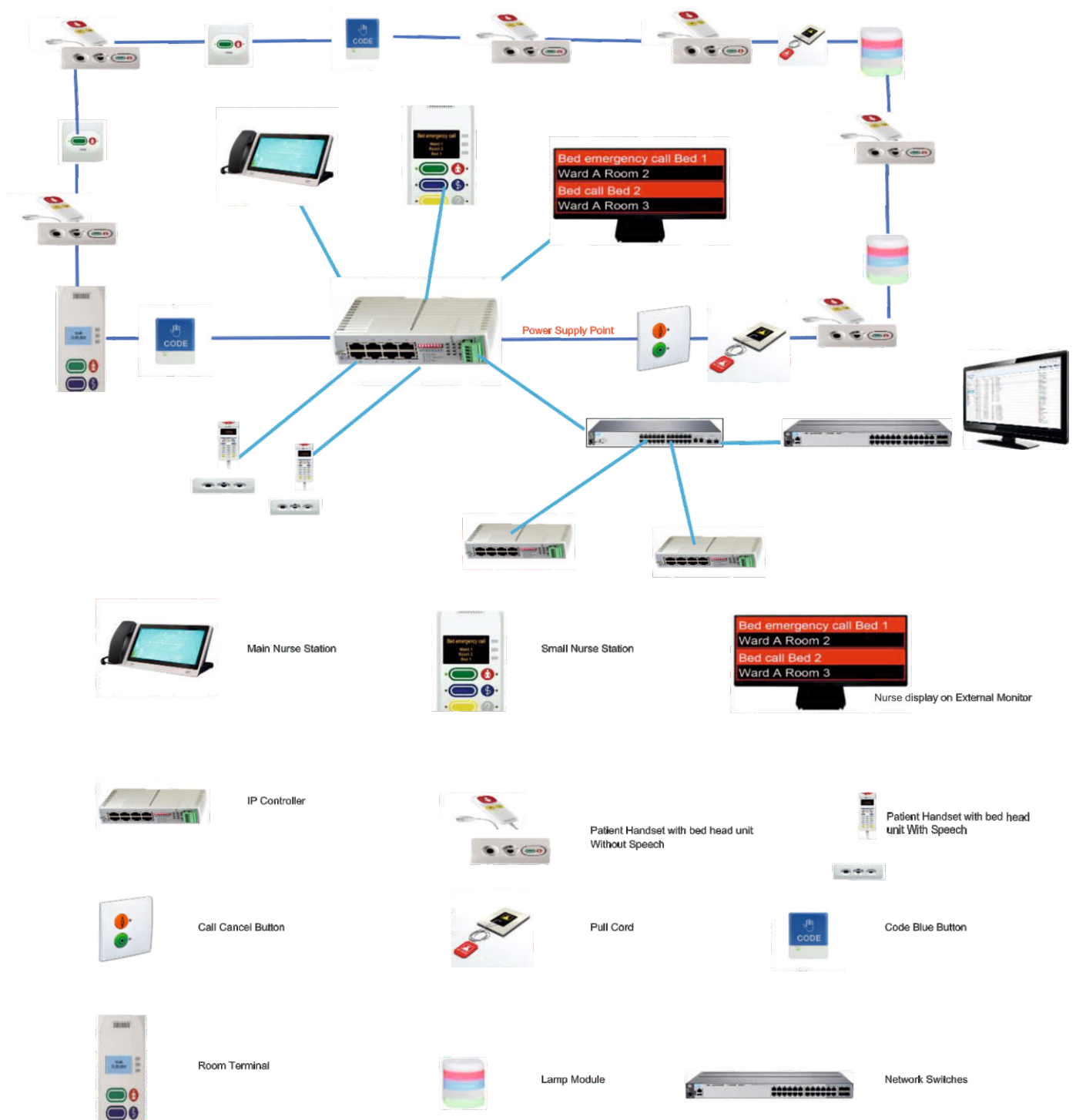
For signal lamps and large text displays, the installation height of 1.5 m - 2.2 m above floor level must be observed (VDE 0834, 5.4.18). This also applies for ceiling mounting.

SCHEMATIC DIAGRAM FOR NURSE CALL SYSTEM



SCHEMATIC FOR NURSE CALL SYSTEM

SCHEMATIC - NURSE CALL SYSTEM



Disclaimer-the above schematic diagram for Nurse Call System is guidance only, Tender inviting authority are free to make addition, deletion ,changes in above diagram as per site & Hospital requirement.

CHAPTER 8

CODES & GUIDELINES FOR SERVICES IN HOSPITALS

- ASHRAE 170-2017 covers patient care areas of Healthcare facilities in new buildings, additions to existing buildings, and alterations to existing buildings. It provides a guideline for Healthcare facility safety and dictates the air changes per hour required in Healthcare settings, pressure relationship requirements, exhaust requirements, filtration and air distribution requirements, humidity and temperature requirements, etc.
- ASHRAE 189.3 Construction, and Operation of Sustainable High-Performance Healthcare Facilities
- Bio-Medical Waste Management Rules, 2016, for Treatment and Disposal of Hospital generated waste.
- FGI Guidelines 2018, Guidelines for Design and Construction of Healthcare Facilities, provides minimum design requirements for Hospitals and its environment.
- IS/ISO 7396 for Medical Gases Pipeline Systems
- ISO 13485, Quality Management System, Medical Devices, Key Standard for installation and servicing of medical devices and related engineering services
- ISO 20017, RFID Standard for Healthcare
- NABH, Hospital Accreditation Standards
- NABL, Hospital Laboratories Accreditation Standards
- NBC 2016 provides Guidance for all services. Its part 4 provides specific Fire & Life Safety guidance and part 9 provides Plumbing & Drainage Guidelines.
- NEC 2011 provides Guidance for all Electrical Services and Lighting Services.
- NFPA 92, A group of Standard on Smoke Control & Management Systems
- NFPA 99, 2018, Healthcare Facilities Code provides comprehensive Guidance for mitigating the hazards of fire, explosion, and electricity.
- NFPA 101, Life Safety Code provides building requirements necessary to protect Hospital Building Occupants from dangers caused by fire, smoke, and toxic fumes.
- Occupational Safety and Health Administration (OSHA) standards for Use of construction materials in Hospital Engineering Services

- The regulations for Radiation safety of International Atomic Energy Agency and Atomic Energy Regulatory Body of India.
- The Rights of Persons with Disabilities Act, 2016 provides for the design of products, environments and services to be usable by all people including Persons with Disabilities to the greatest extent possible.
- Whole Building Design Guide, Hospitals, 2017, design Criteria for Public Hospital buildings in USA
- ANSI/TIA/EIA-569 Telecommunications Pathways and Spaces
- MIL-HDBK-419A Grounding, Bonding, and Shielding for Electronic Equipment and Facilities, Basics, Volume 1 of 2
- MIL-HDBK-419A Grounding, Bonding, and Shielding for Electronic Equipment and Facilities, Application, Volume 2 of 2
- CPWD General Specifications for Heating, Ventilation & Air-Conditioning (HVAC) 2017.
- CPWD General Specifications for Electrical Works Part I Internal -2013.
- CPWD General Specifications for Electrical Works Part IV Sub-Station -2013.
- CPWD General Specifications for Electrical Works Part V Wet Riser & Sprinkler System -2013.
- CPWD General Specifications for Electrical Works Part VI Fire Detection and Alarm System -2018.
- CPWD Compendium of Norms for Designing of Hospitals and Medical Institutions
- In addition, now Green Building Council Guidelines and Energy Audits and preliminary Audits of Gas Services are also applied at pre-construction stage.

CHAPTER 9

LICENSES, PERMITS & STATUTORY OBLIGATIONS FOR HOSPITALS IN INDIA

- Air (Prevention and Control of Pollution) Act, 1981 along with Rules, 1982
- Atomic Energy Regulatory Board
- Bio-Medical Waste Rules, 2016
- Boilers Act 1923
- Building Permit (Completion Certificate)
- Child Labour (Prohibition and Regulation) Act 1986 along with Rules, 1988 and Children (Pledging of Labour) Act 1933.
- Consumer Protection Act, 1986 along with Rules, 1987 amended in 1998
- Delhi Nursing Home Registration Act 1953
- Delhi Private Medical Establishment (Regulations) Act 1956
- Drugs & Cosmetics Act, 1940
- Explosive Act, 1884 along with The Explosive Substance Act 1908 and The Explosives Rules, 1983
- Govt. Order No. 73231/SS B4/92/Home dated 29.09.1993 - Section 304 not applicable in Hospital deaths.
- Indian Lifts and Escalators Act
- National Building Code
- National Electrical Code
- National Commission Acts [Containing 4 Acts -Women Act ,1990 Safai Karamcharies Act, 1993 and Allied Information]
- National Environmental Tribunal Act, 1995
- No Objection Certificate from the Chief Fire Officer
- No Objection Certificate under Bio-medical Waste Rules, 1998
- No Objection Certificate under Pollution Control Act
- Pre-Natal Diagnostic Techniques (Regulation & Prevention of Misuse) Act, 1994 along with Rules, 1996
- Radiation Protection Certificate in respect of All X-Ray Equipment from BARC
- Radiation Protection Rules under BARC Act
- The Blood Bank Permit under Drugs Act
- The Excise Permit to store Spirit
- The Permit to Operate Lifts under the Indian Lifts and Escalators Act

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