**Chapter A10 – Healthcare Engineering Systems**

1. **Person-in-charge and Staffing**
   1. Person-in-charge of Healthcare Engineering Systems

|  |  |
| --- | --- |
| Surname |  |
| First Name |  |
| Name in Chinese |  |
| Post Title |  |
| Qualifications / Training |  |

* 1. Staffing

| **Rank** | **Number of Staff** | **Number of staff who hold the following licence** | | | |
| --- | --- | --- | --- | --- | --- |
| **Electrical** | **Boiler** | **Plumber** | **Other**  **(please specify)** |
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1. **Electrical installations**
   1. Person-in-charge for electrical installations

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| --- | --- |
| Surname |  |
| First Name |  |
| Name in Chinese |  |
| Post Title |  |
| Qualifications |  |

* 1. Summary of healthcare engineering standard(s)[[1]](#footnote-1) by critical care areas and key parameters

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| --- | --- | --- | --- | --- |
| **Critical care area and location** | **Healthcare engineering standard** | **Electrical service\* for:** | **Source of power supply# and back-up time (minute)** | **Connection to isolated power supply**  **(Yes/No)** |
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*\* Electrical services include those for critical medical equipment, general medical equipment, fixed medical lighting, general lighting and other installations in a critical care area*

*# Sources of power supply include normal power supply (N), emergency power supply (E), uninterruptible power supply (UPS) and/or battery with specified backup time, etc.*

* 1. Power supply from electricity company

| **Transformer/ feeder Designation (e.g. TX 1/ LV1)** | **Location (e.g. G/F, Block A)** | **Rating  (e.g. 1500 kVA/800A)** | **Maximum Demand[[2]](#footnote-2) (e.g. 900 kVA)** | **Spare Capacity in percentage (e.g. 40%)** |
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* 1. Fixed electrical installation

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| 1. Regular inspection, testing and maintenance of fixed electrical installation is carried out by | Choose an item. |

* 1. Statutory “Periodic Inspection, Testing and Certification (PITC) for fixed electrical installations” - please provide the expiry date(s) of Form WR2 for existing installation(s) and/or the due date(s) of the next PITC Completion for new installation(s))

| **Building (e.g. Block A, B, D)** | **Expiry/due Date (MM/YYYY)** |
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* 1. Electrical discrimination analysis for power protective gears conducted in the past 5 years (please provide the completion date or provide the anticipated date of completion of these analyses)

| **Building (e.g. Block A, B, D)** | **Date (MM/YYYY)** |
| --- | --- |
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* 1. Emergency generator

| **Designation number of emergency generator** | **Location (e.g. Generator Room, G/F, Block A)** | **Rating**  **(e.g. 1 × 500 kVA)** | **Load backed up by Generator (e.g. FSI/non-FSI/mixed\*)** | **Date of last on-load testing of generator (DD/MM/YYYY)** |
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*(\* Remark: Please choose one as appropriate.)*

* 1. Central uninterruptible power supply (UPS)

| **Designation number of UPS** | **Location (e.g. UPS Room, 5/F, Block C)** | **Rating**  **(e.g. 60 kVA)** | **Load backed up by UPS (e.g. surgical lamp & power points at OT1)** | **Date of last on-load testing of UPS (DD/MM/YYYY)** |
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*(Remark: Central UPS refers to UPS installed by the Hospital to supply various medical equipment for clinical services. It excludes UPS supplied by equipment vendor as part of a medical equipment.)*

* 1. Isolated power supply (IPS)

| **Designation number of IPS** | **Service location (e.g. OT1, 4/F, Main Block)** | **Rating**  **(e.g. 6 kVA)** | **Interval of regular maintenance (e.g. weekly, monthly, quarterly, yearly)** |
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* 1. Policies and Procedures

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| 1. Interval of regular test for emergency generator(s) serving medical equipment (Non-FSI or Mixed type) |  |
| 1. There is 24-hour technical support for electrical system | Choose an item. |
| 1. There is contingency plan for the suspension of electricity in critical care areas. | Choose an item. |

*(Remark: Critical care areas are areas that provide life support or complex surgery, or where failure of equipment or a system is likely to jeopardise the immediate safety or even cause major injury or death of patients or caregivers. Examples are operating theatre / room, cardiac catheterization service, interventional angiography room, intensive care unit, high dependency unit, special care unit, cardiac care unit, labour room, and accident & emergency resuscitation bay/room.)*

1. **Heating, Ventilation and Air-conditioning**
   1. Person-in-charge for HVAC Systems

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| --- | --- |
| Surname |  |
| First Name |  |
| Name in Chinese |  |
| Post Title |  |
| Qualifications / Training |  |

* 1. Summary of healthcare engineering standard(s)[[3]](#footnote-3) by specialized ventilation areas and key parameters
     1. Operating rooms

| **Operation rooms**  **(location)** | **Healthcare engineering standard** | **Differential pressure to adjacent areas**  **(Pa)** | **Air change per hour (outdoor /total)** | **Filter efficiency (MERV /HEPA)** | **Relative humidity (%)** | **Room temperature (oC)** |
| --- | --- | --- | --- | --- | --- | --- |
| e.g. Operation Theatre 1, 3/F, Block B | HTM2025 & ICB's I.C. Guidelines | >25Pa | 25/25 | H14 | 40-60 | 20-24 |
| Maternity OT 2/F,  Block A | HTM03-01 & ICB’s I.C. Guidelines | >25Pa | 25/25 | H14 | 40-60 | 20-24 |
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* + 1. Airborne Infection Isolation (AII) Rooms

*An AII Room is a room designed with negative pressure where* ***the Hospital intends to******isolate persons with a suspected or confirmed airborne infectious disease******/ novel Acute Respiratory Diseases (ARDs)*** *including in-patient bed, day bed****,*** *other clinical service. This room must fulfill the relevant healthcare engineering standard(s).*

3.2.2.1 AII Rooms for In-patient Bed

| **Isolation room**  **(Location)** | **Healthcare engineering standard** | **Differential pressure to adjacent areas (Pa)** | **Air change per hour (outdoor /total)** | **Filter efficiency (MERV /HEPA)** | **Relative humidity (%)** | **Room temperature (oC)** |
| --- | --- | --- | --- | --- | --- | --- |
| e.g. Isolation room 1, 5/F, Block A |  |  |  |  |  |  |
| e.g. Isolation room 2, 5/F, Block A |  |  |  |  |  |  |
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3.2.2.2 AII Rooms for Day Bed

| **Isolation room**  **(Location)** | **Healthcare engineering standard** | **Differential pressure to adjacent areas (Pa)** | **Air change per hour (outdoor /total)** | **Filter efficiency (MERV /HEPA)** | **Relative humidity (%)** | **Room temperature (oC)** |
| --- | --- | --- | --- | --- | --- | --- |
| e.g. Emergency Medical Centre, Room 8A |  |  |  |  |  |  |
| e.g. Emergency Medical Centre, Room 8B |  |  |  |  |  |  |
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3.2.2.3 AII Rooms for Other Clinical Services

| **Isolation room**  **(Location)** | **Healthcare engineering standard** | **Differential pressure to adjacent areas (Pa)** | **Air change per hour (outdoor /total)** | **Filter efficiency (MERV /HEPA)** | **Relative humidity (%)** | **Room temperature (oC)** |
| --- | --- | --- | --- | --- | --- | --- |
| e.g. OPD Triage, Room 6 |  |  |  |  |  |  |
| e.g. Isolation labour room 7 |  |  |  |  |  |  |
| e.g. X-ray Room 3, Block 1 |  |  |  |  |  |  |
| e.g. Bronchoscopy Room, 4/F |  |  |  |  |  |  |
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* + 1. Protective environment room

*Protective environment room is a room designed with positive pressure where* ***the******Hospital intends to isolate severely immunocompromised patients, notably allogeneic Haemopoietic Stem Cell Transplant (HSCT) recipients****. This room must fulfill the relevant healthcare engineering standard(s).*

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| **Protective environment room**  **(location)** | **Healthcare engineering standard** | **Differential pressure to adjacent areas**  **(Pa)** | **Air change per hour (outdoor /total)** | **Filter efficiency (MERV /HEPA)** | **Relative humidity (%)** | **Room temperature (oC)** |
| e.g. Reverse Isolation Ward 3A, Block 2 |  |  |  |  |  |  |
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* + 1. Other specialized ventilation areas

| **Specialized ventilation area and location** | **Healthcare engineering standard** | **Differential pressure to adjacent areas (Pa)** | **Air change per hour (outdoor /total)** | **Filter efficiency (MERV /HEPA)** | **Relative humidity (%)** | **Room temperature (oC)** |
| --- | --- | --- | --- | --- | --- | --- |
| e.g. Labour room 6 |  |  |  |  |  |  |
| e.g. Endoscopy Centre Room 4 |  |  |  |  |  |  |
| e.g. Pathology Negative Pressure Room, LG/2F, Block E |  |  |  |  |  |  |
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* 1. Compliance check of ventilation equipment and ventilation system setting

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| **Major Specialized Ventilation Area (e.g. Operating Theatre Room No. 1, 3/F, Block B )** | **Healthcare Engineering Standard** | **Last date of compliance check** |
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* 1. Chiller Plant

| **Chiller No.** | **Location (e.g. R/F, Main Block)** | **Type (e.g. Centrifugal/ Screw/Oil free)** | **Cooling method (e.g. air-cooled/water cooled)** | **Cooling capacity (e.g. 820kW)** | **Service area (e.g.G/F to 8/F, Main Block)** |
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* 1. Fresh water cooling tower

| **Cooling Tower No.** | **Location (e.g. R/F, Main Block)** | **Heat rejection capacity** | **Interval of water quality monitoring (e.g. monthly, bi-monthly, quarterly)** | **Date of last independent audit[[4]](#footnote-4)** |
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* 1. Policies and Procedures

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| 1. There is contingency plan for the suspension of ventilation and air-conditioning system serving specialized ventilation areas for clinical use. | Choose an item. |
| 1. Regular inspection, testing and maintenance of heating, ventilating and air-conditioning installations by: | Choose an item. |
| 1. There is regular compliance check for the ventilation settings in specialized ventilation areas for clinical use | Choose an item. |

*(Remark: Specialized ventilation areas are areas with special ventilation design for infection control and / or occupational safety)*

1. **Storage and Supply of Medical Gases**
   1. Basic Information

|  |  |
| --- | --- |
| 1. There is/are medical gas pipeline system(s) | Choose an item. |
| 1. There is/are dangerous goods store(s) for medical gas(es) | Choose an item. |

* 1. Person-in-charge of Management for Medical Gases

|  |  |
| --- | --- |
| Surname |  |
| First Name |  |
| Name in Chinese |  |
| Post Title |  |
| Qualifications / Training |  |

* 1. Authorized Person of MGPS appointed.

| **Name** | **Post Title** | **Documentation proof of appointment (e.g. Hospital's Safety & Quality Policy Manual)** | **Qualification and training** |
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* 1. Summary of healthcare engineering standard(s)[[5]](#footnote-5) by medical gas pipeline systems and key parameters

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| **Type of piped medical gas** | **Healthcare engineering standard** | **System nominal pressure (kPa)** | **System design flow (L/min)** |
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* 1. Dangerous Goods (DG) Stores for Medical Gases

| **DG Store Location (e.g. G/F, Block A)** | **Description of DG**  **(e.g. liquid oxygen)** | **Category and class of DG (e.g. Cat. 2, Cl. 2 )** | **Maximum quantity (e.g. 50L water capacity x 24)** | **Function**  **(e.g. VIE tank, Manifold room, CGC store)** |
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* 1. Medical Gas Pipeline Systems (MGPS)

(EXAMPLE)

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| 0 | **Oxygen** |  |
| 0.1 | Primary supply  Capacity (L)  Location | ~~VIE~~ / LGC / ~~CGC~~ \*  2 x 3 x 165L (S size)  G/F DG Store |
| 0.2 | Second Supply  Capacity (L)  Location | ~~VIE / LGC~~ / CGC / ~~Local / Nil~~\*  2 x 2 x 50L (R size)  G/F DG store |
| 0.3 | Reserve Supply  Capacity (L)  Location | ~~LGC / CGC~~ / Local / ~~Nil~~ \*  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Emergency infill point |

*(Remark: VIE: vacuum-insulated evaporator*

*LGC: liquid gas container*

*CGC: compressed gas cylinder)*

*Capacity(L) is measured by water capacity*

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| --- | --- | --- |
| 1 | **Oxygen** |  |
| 1.1 | Primary supply | VIE / LGC / CGC\* |
|  | Capacity (L) |  |
|  | Location |  |
| 1.2 | Second Supply | VIE / LGC / CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |
| 1.3 | Reserve Supply | LGC / CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

|  |  |  |
| --- | --- | --- |
| 2 | **Medical Air** | |
| 2.1 | Primary supply | Compressor No. (1, 2, 3, 4)\* / CGC\* |
|  | Capacity (L/min, L)\* |  |
|  | Location |  |
| 2.2 | Second Supply | Compressor No. (1, 2, 3, 4)\* / CGC / Local / Nil\* |
|  | Capacity (L/min, L)\* |  |
|  | Location |  |
| 2.3 | Reserve Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

|  |  |  |
| --- | --- | --- |
| 3 | **Surgical Air** | |
| 3.1 | Primary supply | Compressor No. (1, 2, 3, 4)\* / CGC\* |
|  | Capacity (L/min, L)\* |  |
|  | Location |  |
| 3.2 | Second Supply | Compressor No. (1, 2, 3, 4)\* / CGC / Local / Nil\* |
|  | Capacity (L/min, L)\* |  |
|  | Location |  |
| 3.3 | Reserve Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

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| 4 | **Vacuum** | | |
| 4.1 | Primary supply | Vacuum pump No. 1, 2, 3, 4\* |
|  | Capacity (L/min) |  |
|  | Location |  |
| 4.2 | Second Supply | Vacuum pump No. 1, 2, 3, 4 / Local / Nil\* |
|  | Capacity (L/min) |  |
|  | Location |  |
| 4.3 | Reserve Supply | Protable suction pump / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

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| 5 | **Carbon dioxide** | |
| 5.1 | Primary supply | CGC |
|  | Capacity (L) |  |
|  | Location |  |
| 5.2 | Second Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |
| 5.3 | Reserve Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

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| 6 | **Nitrous Oxide** | |
| 6.1 | Primary supply | CGC |
|  | Capacity (L) |  |
|  | Location |  |
| 6.2 | Second Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |
| 6.3 | Reserve Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

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| 7 | **Entonox** | |
| 7.1 | Primary supply | CGC |
|  | Capacity (L) |  |
|  | Location |  |
| 7.2 | Second Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |
| 7.3 | Reserve Supply | CGC / Local / Nil\* |
|  | Capacity (L) |  |
|  | Location |  |

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| --- | --- | --- |
| 8 | **Anaesthetic Gases Scavenging System** | |
| 8.1 | Primary supply | AGSS pump No. 1, 2, 3, 4\* |
|  | Capacity (L/min) |  |
|  | Location |  |
| 8.2 | Second Supply | AGSS pump No. 1, 2, 3, 4\* |
|  | Capacity (L/min) |  |
|  | Location |  |
| 8.3 | Reserve Supply | Portable pump / Nil\* |
|  | Capacity (L/min) |  |
|  | Location |  |

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| 9 | **Sources of Supply – Other (Please specify:**       ) | |
| 9.1 | Primary supply |  |
|  | Capacity (L) |  |
|  | Location |  |
| 9.2 | Second Supply |  |
|  | Capacity (L) |  |
|  | Location |  |
| 9.3 | Reserve Supply |  |
|  | Capacity (L) |  |
|  | Location |  |

* 1. Regular/scheduled inspection, testing and maintenance of MGPS

| **Major item(s) examined (e.g. alarm panels, terminal units, pressure setting of valves)** | **Contract-out** | **Maintenance Interval**  **(e.g. Monthly, bi-monthly, quarterly, half-yearly, annual)** |
| --- | --- | --- |
|  | Choose an item. |  |
|  | Choose an item. |  |
|  | Choose an item. |  |
|  | Choose an item. |  |

* 1. Quality test report for medical air generated by compressor plant

| **Medical air supply system and location (e.g. MA4 at Main Block)** | **Standard complied (e.g. HTM 02-01)** | **Date of last compliance check** |
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* 1. Policies and Procedures

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| 1. There are guidelines on handling of compressed and liquefied medical gas | Choose an item. |
| 1. There is 24 hours emergency call-out service by specialist contractor for medical pipeline system | Choose an item. |
| 1. There is contingency plan for the suspension of medical gases | Choose an item. |
| 1. There is a safety management system such as a permit-to-work (PTW) system established to govern works on the MGPS | Choose an item. |

1. **Other Hospital’s Engineering Facilities**
   1. Regular inspection, testing and maintenance of boilers

| **Major serve areas (e.g. CSSD, laundry)** | **Type of Boilers**  **(e.g. Steam boiler, Water tube)** | **Capacity**  **(e.g. power, liter)** | **Type of supply (e.g. Fuel, town gas, electricity or hybrid)** |
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1. **Dangerous Goods (DG) Stores for Diesel Fuel (i.e. Emergency Generators, Boilers)**

| **DG Store Location (e.g. UG, Block A)** | **Description of DG**  **(e.g. Diesel oils)** | **Category and class of DG (e.g. Cat. 5, Cl. 3 )** | **Maximum quantity (e.g. 5000L)** | **Service equipment (e.g. Gen. set, Boiler)** |
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*(Remark: For storage of medical gases, please refers to item 4.4)*

1. For existing healthcare engineering system installations, the current version of guidelines, standards and codes, applicable at the time of the commissioning of the installations applies. [↑](#footnote-ref-1)
2. For an existing power supply, it is the measured maximum demand in the past year. For a new power supply, it is the designed maximum demand. [↑](#footnote-ref-2)
3. For existing healthcare engineering system installations, the current version of guidelines, standards and codes, applicable at the time of commissioning of the installations applies. [↑](#footnote-ref-3)
4. Independent audit in accordance with the Code of Practice for Fresh Water Cooling Towers promulgated by the EMSD. N/A in new installations. [↑](#footnote-ref-4)
5. For existing healthcare engineering system installations, the current version of guidelines, standards and codes, applicable at the time of commissioning of the installations applies. [↑](#footnote-ref-5)