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China Association for Engineering Construction Standardization

Design Standard of Outpatient for Infectious Disease in General Hospital—I

China Planning Press

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1 General Provisions

1.0.1 This standard is formulated to regulate the scientificity and rationality of the design of the outpatient department for infectious diseases in a general hospital, meeting requirements for safety, hygiene, economy, applicability, green building, environmental protection, and prefabricated construction.

1.0.2 This standard applies to the new construction, renovation, and expansion of infectious disease clinics in general hospitals.

1.0.3 The design of the outpatient department for infectious diseases in a general hospital shall comply with the national and regional healthcare development plans, fully utilize existing resources of the general hospital, avoid redundant construction, and achieve integrated design for both routine and epidemic situations.

1.0.4 The construction of the outpatient department for infectious diseases in a general hospital shall prioritize infection control, emphasize treatment efficiency, adhere to a human-centered approach, provide favorable medical conditions for patients and a safe and hygienic working environment for medical, nursing, and support staff.

1.0.5 The design of the outpatient department for infectious diseases in a general hospital shall comply not only with the provisions of this standard but also with the relevant provisions of current national standards in China and current relevant standards of the China Association for Engineering Construction Standardization.

2 Terms and definitions

2.1 Terms

2.1.1 Infectious disease clinic

A comprehensive outpatient department in a general hospital at any level, encompassing function-independent units such as fever clinic, tuberculosis clinic, and other respiratory clinics, as well as gastrointestinal clinic, hepatitis clinic, and AIDS clinic, either all or part of these. This department also undertakes prevention and control tasks, including screening, differential diagnosis, isolation, and referral of patients with suspected infectious diseases.

2.1.2 Airborne transmission

Disease transmission caused by pathogen-carrying micro-particles through air movement.

2.1.3 Clean area

An area that shall not be contaminated by pathogenic microorganisms carried by patients with infectious diseases or suspected infectious diseases, primarily comprising auxiliary living areas for medical staff during work periods, including work, duty, rest, and corresponding support service rooms.

2.1.4 Semi-contaminated area

An area between the clean area and the contaminated area, consisting of medical staff workrooms where potential pathogenic microorganisms may be present, including functional rooms such as treatment preparation room, nursing station, and connecting passageway.

2.1.5 Contaminated area

An area at risk of direct contamination by pathogenic microorganisms carried by patients with infectious diseases or suspected infectious diseases. It includes all indoor areas accessible to such patients, as well as places for temporary storage and handling of their contaminants such as blood, body fluids, secretions, and excretions. It mainly includes functional rooms such as registration, waiting area, consulting room, treatment room, infusion room, disposal room, soiled utility room, examination and sampling room, nucleic acid testing room, radiology room, pharmacy, emergency room, observation room, and nursing room.

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2.1.6 Buffer room

A small enclosed space located between areas of different hygiene safety levels, with doors on both sides, forming a hygiene safety barrier through air distribution and air pressure control.

2.1.7 Hygiene passing through area

A transitional space located between areas of different hygiene safety levels for performing hygiene procedures such as donning/doffing isolation protective clothing, changing clothes, and showering.

2.1.8 Environment controlled zone

An area within the contaminated area and semi-contaminated area where technical measures shall be taken to control environmental parameters or airflow. These areas have definite or potential risks of pathogen transmission and personnel infection, and their indoor environmental parameters shall be controlled.

2.1.9 Building environment management and building automation system

Comprises two subsystems: building environment management and building automation system. The primary function of the building environment management system is to collect, transmit, store, display, and alarm indoor and outdoor environmental parameters. The primary function of the building automation system is to monitor, regulate, and control relevant building equipment systems to ensure indoor environmental parameters meet pre-set thermal comfort requirements, medical service needs, and infection control requirements.

2.1.10 Isolation room

A temporary nursing space for observing and treating patients with infectious diseases or for screening patients with suspected infectious diseases.

2.1.11 Negative pressured airborne infection isolation room

An isolation room where, to prevent the airborne spread of pathogenic microorganisms, indoor air pressure is maintained at a negative level relative to adjacent connected environments through air pressure control.

2.2 Abbreviations

CT: Computerized Tomography

DR: Digital Radiography

PCR: Polymerase Chain Reaction

3 Medical Process and Infection Control Requirements

3.1 Medical Process

3.1.1 The construction scale and content of the outpatient department for infectious diseases shall be determined based on service radius, diagnostic and treatment capacity, specialty characteristics, and regional functional positioning.

3.1.2 The medical process parameters for the outpatient department for infectious diseases shall be determined based on the actual hospital situation and the following indicators

1 The consulting rooms in the infectious disease clinics in secondary and above general hospitals shall not be fewer than 3 rooms, and the standby consulting rooms shall not be fewer than 1 room;

2 The observation rooms in the infectious disease clinics in tertiary and secondary general hospitals shall not be less than 10 rooms and 5 rooms, respectively.

3.1.3 The outpatient department for infectious diseases shall be rationally divided into clean areas, semi-contaminated areas, and contaminated areas according to safety and hygiene requirements, with clear signage. Medical staff entering and leaving contaminated areas must pass through a hygiene passing through area or buffer room. If connection between areas of different hygiene safety levels is necessary, a buffer room shall be provided.

3.1.4 The infectious disease clinics shall rationally design entrances and exits for patients and medical staff, item transportation, flow lines for patients and medical staff, and clean and flow lines for contaminated items, achieving separation and segregation of medical staff/patients and clean/contaminated items.

3.1.5 The functional configuration of the outpatient department for infectious diseases shall be complete. Room settings for each area may refer to

Table 3.1.5.

3.1.6 The outpatient department for infectious diseases may set up functional rooms such as DR room, CT room, PCR room, isolation room, negative pressured airborne infection isolation room, negative pressure operating room, and intensive care unit (ICU) as needed.

3.2 Infection Control Requirements

3.2.1 Each function-independent clinic within the outpatient department for infectious diseases shall be independently zoned. Respiratory clinics such as fever clinic and tuberculosis clinic shall not be connected to other clinics; if connection is necessary, isolation measures shall be taken. Entrances and exits for patients and medical staff in each clinic shall be separate, and their passageways shall not cross.

3.2.2 Infection prevention, control, and protection requirements shall be followed, strictly adhering to the risk level zoning principle for clean areas, semi-contaminated areas, and contaminated areas, implementing corresponding protective measures in areas of different risk levels.

3.2.3 Zones for registration, payment, and medication dispensing in the outpatient department for infectious diseases should adopt online or self-service equipment to reduce direct personnel contact and minimize cross-infection risk.

4 Site Selection and Architecture

4.1 Site Selection and Layout

4.1.1 The outpatient department for infectious diseases should have an independent external entrance/exit, with clear signage and guidance at the entrance/exit, facilitating independent zoning and closed management during epidemics.

4.1.2 Newly-built outpatient department for infectious diseases shall be designed as independent buildings, forming their own zone, and located at the periphery of the hospital, avoiding dense population.

4.1.3 A green isolation and hygiene spacing of not less than 20 m shall be established between the newly built outpatient department for infectious diseases and other buildings within the hospital, as well as surrounding buildings outside the hospital.

4.1.4 As part of a general hospital, the site selection for a new outpatient department for infectious diseases considers both independent infection control and rational utilization of the hospital mechanical and electrical (M&E) system to control construction and operating costs.

4.1.5 The site shall consider support facilities for the outpatient department for infectious diseases, providing parking areas for ambulances, medical supply transport vehicles, logistics supply transport vehicles, and patient transfer vehicles. An ambulance cleaning and disinfection area should be provided.

4.2 Functional Setup

4.2.1 The outpatient department for infectious diseases shall establish separate clinics for different diseases. Each clinic shall have a complete functional configuration; triage, registration, consultation, testing, examination, medication dis-

Table 3.1.5 Room Settings for Different Areas in Outpatient Department for Infectious Diseases

Area	Required Rooms	Optional Rooms
Clean area	Changing room, duty room, office, toilet	Rest room, demonstration classroom, consultation room, shower room, storage room, monitoring room, etc.
Semi-contaminated area	Buffer room, hygiene passing through area, observation zone nursing station and treatment room, disposal room, medical staff office	Disinfection room, storage room, etc.
Contaminated area	Triage point, waiting area, registration/payment, pharmacy, nursing station, consulting room, treatment room, disposal room, emergency room, observation room, specimen collection room, temporary soiled waste storage room, soiled utility room, patient toilet	Rooms serving patients, such as radiology room, laboratory, infusion room, ultrasound room, and baby care room.

pensing, treatment, infusion, and observation shall all be independently completed within its own area.

4.2.2 Within the respiratory clinic, the adult clinic and the pediatric clinic should be zoned.

4.2.3 Different types and items of testing, such as rapid testing and PCR, shall be planned holistically across the whole hospital.

4.3 Room Composition

4.3.1 Entrances, exits, and passageways for patients and medical staff shall be independent and completely separate. The entrance/exit and passageway for medical staff are located at the clean area end, and the entrance/exit and passageway for patients is located at the contaminated area end.

4.3.2 Room layout shall be rationally arranged according to clinical diagnosis/treatment and nosocomial infection prevention/control requirements. The flow of people and materials shall follow the sequence: clean - semi-contaminated - contaminated - decontaminated - clean. The interior of each department should have separate exits and entrances based on the treatment process; medical waste shall have a dedicated exit and a separate storage point.

4.3.3 The workflow for patient treatment shall follow the process: admission - registration or payment - waiting - consultation - diagnosis or testing - medication dispensing - infusion - observation - discharge.

4.3.4 The workflow for medical staff shall comply with the following provisions

1 The workflow for medical staff in fever clinics shall follow the sequence: clean area - donning area - clinic area or observation ward - doffing area - clean area;

2 The workflow for medical staff in other infectious disease clinics shall follow the sequence: clean area - buffer room - clinic area or observation ward - buffer room - clean area.

4.3.5 Waste shall be collected separately by area (clean area, contaminated area) and delivered accordingly; the medical waste flow line shall follow the process: temporary waste storage room - waste passageway - hospital medical waste temporary storage area.

4.3.6 Consulting rooms shall be single-patient. The net area of each consulting room should not be less than 10 m^2; the room width should be 3.0~3.3 m, depth 3.6~4.5 m, and net height not less than 2.6 m.

4.3.7 Public toilets used by outpatients should use sensor-operated automatic doors or labyrinth-type vestibules without door leaves.

4.3.8 Observation wards shall comply with the following provisions

1 The number of observation beds shall be determined based on department service needs. Observation rooms for fever patients shall be single rooms with independent toilets;

2 The clear distance between two parallel beds shall not be less than 1.1 m, and the clear distance between the edge of a bed against a wall and the wall surface shall not be less than 0.6 m;

3 The clear width of a single row of beds passageway shall not be less than 1.1 m, and the clear width of the passageway at the ends of double rows of beds shall not be less than 1.4 m.

4.3.9 Specimen collection types include blood, sputum, throat swabs, feces, and urine. Collection areas for different types should be set up independently.

4.4 Construction and Finishes

4.4.1 Technical requirements for fire protection, daylighting, sound insulation, waterproofing, thermal insulation, seismic reduction, and isolation shall comply with relevant provisions of current national standards.

4.4.2 Interior surface finishes shall be made of materials resistant to scrubbing, corrosion, and seepage. Internal and external corners of walls and floors should be rounded.

4.4.3 Building construction shall meet performance requirements such as condensation prevention, seepage prevention, and airtightness. Sealing

measures shall be taken where M&E pipes and conduits pass through. Rooms generating radiation shall meet construction requirements for radiation shielding on all six sides.

4.4.4 Floor finishes in patient areas shall use anti-slip materials.

4.4.5 External doors shall meet performance requirements for air tightness, water tightness, wind pressure resistance, thermal insulation, and sound insulation. Internal doors shall meet performance requirements for fire resistance, radiation protection, sound insulation, impact resistance, and resistance to scrubbing and disinfection. Non-through-view windows should be installed on doors on both sides of corridors.

4.4.6 External windows shall meet performance requirements for air tightness, water tightness, wind pressure resistance, thermal insulation, sound insulation, and safe use. Screens or other insect-proof facilities should be installed. Internal windows shall be set up according to actual needs such as registration, medication dispensing, sample collection, and radiation protection. Pass-through windows located between different risk-level areas shall be double-door airtight interlocked pass-through windows equipped with ultraviolet disinfection lamps.

4.4.7 Consulting rooms shall be equipped with examination beds, consulting desks, doctor's chairs, patient stools, privacy curtains, sensor-operated washbasins, etc. Patient passageways shall have bumper guards and assistive handrails. Observation wards shall have infusion rails.

4.5 Others

4.5.1 The building site, entrances/exits, various clinic areas, and observation zones shall be equipped with barrier-free facilities complying with relevant provisions of current national standards.

4.5.2 Drinking water facilities for patients and medical staff shall be set up separately by area. Humanized spaces convenient for patients and medical staff should be provided, such as baby care room, family visitation waiting area, and medical staff rest area.

5 Heating, Ventilation, and Air Conditioning (HVAC)

5.1 General Provisions

5.1.1 The design of heating, ventilation, and air conditioning (HVAC) system for infectious disease clinics shall comply with relevant provisions of current national standards Design Code for Heating Ventilation and Air Conditioning of Civil Buildings (GB50736), Code for design of infectious diseases hospital (GB50849), and Code for design of general hospital (GB51039).

5.1.2 The HVAC system for infectious disease clinics shall be determined according to technical and economic comparisons based on disease transmission methods, hazard levels, and layout. The setup of the HVAC system shall facilitate the setup and energy-efficient operation of automatic control systems.

5.1.3 Mechanical ventilation systems shall be installed in infectious disease clinics and set up independently in clean area, semi-contaminated area, and contaminated area.

5.1.4 An independent system shall be set up for the triage point at the entrance of the outpatient department for infectious diseases.

5.1.5 HVAC condensate shall be collected centrally by zone and discharged into the indoor drainage system.

5.2 Indoor Design Parameters

5.2.1 Indoor design parameters for main rooms in the outpatient department for infectious diseases shall comply with the provisions of Table 5.2.1.

5.2.2 The outdoor air volume per person in clean areas shall not be less than 40 m^3/h, the outdoor air volume per room shall not be less than 150 m^3/h, and the minimum outdoor air change frequency shall not be less than 3 times per hour.

5.2.3 Rooms in contaminated areas shall maintain negative pressure; the exhaust air volume of each room shall be at least 150 m^3/h greater than the supply air volume.

5.2.4 The minimum outdoor air change frequency

Table 5.2.1 Indoor Design Parameters for Main Rooms in Outpatient Departments for Infectious Diseases

Room	Summer		Winter	
	Dry Bulb Temperature (℃)	Relative Humidity (%)	Dry Bulb Temperature (℃)	Relative Humidity (%)
Ward	26~27	50~60	20~24	40~50
Consulting Room	26~27	50~60	18~22	40~50
Changing Room	26~27	50~60	20~24	40~50
Waiting Room	26~27	50~60	18~22	40~50
Laboratories	25~27	45~60	20~22	45~50
Pharmacy	25~27	45~50	18~20	40~45
Drug Storage Room	22	Below 60	16	Below 60
Radiology Room	25~27	50~60	23~24	40~45
Management Room	26~27	50~60	18~20	40~45

for non-respiratory infectious disease zones shall not be less than 3 times per hour, for laboratories and examination rooms not less than 6 times per hour, and for disposal rooms and emergency rooms not less than 12 times per hour.

5.2.5 The minimum outdoor air change frequency for respiratory infectious disease zones shall not be less than 6 times per hour, and for disposal rooms and emergency rooms not less than 12 times per hour.

5.2.6 The minimum outdoor air change frequency for doffing protective/isolation clothing rooms shall be 20 times per hour, and make-up air measures shall be provided.

5.3 Cooling/Heating Source and Terminal Unit

5.3.1 Priority shall be given to using the hospital centralized cooling/heating sources. When this cannot meet independent operation requirements, separate cooling/heating sources shall be installed.

5.3.2 Centralized cooling/heating source equipment should consist of not less than two units, ensuring that when one unit is down due to failure, the remaining units may meet 75% of the total operating load.

5.3.3 The outpatient department for infectious diseases located in regions with heating provision shall have centralized heating provision. When air conditioning is not provided, the heating should use radiator systems.

5.3.4 When using air conditioning for cooling and heating, indoor airflow in respiratory disease areas shall avoid flowing from pollutant source generation areas towards medical staff clean areas.

5.3.5 Outdoor air systems shall not share air terminals with air conditioning systems.

5.3.6 When using single pass full fresh air flow systems, energy-saving measures shall be provided.

5.4 Ventilation System

5.4.1 The exhaust outlets of exhaust systems in contaminated areas shall be located far from the intake openings of air supply systems and personnel activity areas. The vertical distance above the intake opening shall not be less than 6m, and the horizontal distance shall not be less than 20 m; if this cannot be satisfied, necessary measures shall be taken in conjunction with the local prevailing wind direction.

5.4.2 Exhaust ventilation for public toilets shall be set up by horizontal area; different disease types shall not share vertical ducts.

5.4.3 Exhaust from negative pressured airborne infection isolation rooms shall be set up independently for high-altitude discharge. Toilet exhaust in isolation rooms shall be designed uniformly with the room exhaust. The outdoor inlet of exhaust fans should reserve space for installing high-efficiency filters.

5.4.4 Outdoor air handling units and air conditioning units shall be located in areas convenient for maintenance, such as outdoors, on rooftops, and in clean areas, and shall not be located in semi-

contaminated or contaminated areas.

5.4.5 Exhaust fans for semi-contaminated and contaminated areas shall be located at the end of the exhaust duct, maintaining the entire duct under negative pressure and discharging at high altitude. They should be combined with filter sections as exhaust fan units. Outlets shall have check valves and rain protection measures.

5.4.6 Laboratories shall have independent exhaust systems.

5.4.7 Air purification and disinfection devices installed within ventilation systems shall fully cover the purification and disinfection zone within central air conditioning and outdoor air system ducts, achieving rapid disinfection and decomposition of bacteria, viruses, and microorganisms in indoor and outdoor air. The air purification and disinfection devices used shall not release toxic or harmful substances.

5.4.8 Air purification and disinfection devices shall be evaluated for their killing rate against *Staphylococcus aureus* (ATCC 6538) and *Escherichia coli* (8099).

5.5 Others

5.5.1 High-efficiency filters shall undergo on-site scanning and be confirmed leak-free before being put into service.

5.5.2 Ducts and insulation installed outdoors should use materials resistant to outdoor environmental conditions to reduce secondary pollution caused by external environmental influences.

5.5.3 Condensate drain outlets of surface coolers should be located in positive pressure sections; otherwise, devices that prevent back suction and can smoothly drain condensate under negative pressure shall be installed. Condensate drain pipes shall not be directly connected to sewer pipes.

5.5.4 Spare exhaust fans and filters of the largest model sizes for clean areas, semi-contaminated areas, and contaminated areas shall be on backup in response to sudden failures.

6 Water Supply and Drainage

6.1 General Provisions

6.1.1 The water supply and drainage system for infectious disease clinics shall be designed holistically.

6.1.2 The water supply and drainage design for infectious disease clinics shall comply with relevant provisions of current national standards *Code for design of building water supply and drainage* (GB 50015), *Code for design of infectious diseases hospital* (GB 50849), and *Code for design of general hospital* (GB 51039).

6.1.3 Sealing devices shall be installed where water supply and drainage pipelines pass through clean areas, semi-contaminated areas, and contaminated areas. The sealing tightness shall meet the tightness requirements of the respective area.

6.1.4 Maintenance valves and backflow preventers shall be installed on main and branch pipelines of domestic water supply and domestic hot water supply, preferably located in clean areas.

6.2 Water Supply

6.2.1 Domestic water quality shall comply with relevant provisions of the current national standard *Standards for drinking water quality* (GB 5749).

6.2.2 Domestic water consumption quotas should be determined according to Table 6.2.2.

6.2.3 The layout of water supply pipelines in infectious disease clinics shall comply with the following provisions

1 The water supply intake pipe shall be set up separately, introduced from the clean area, and equipped with a water meter;

2 The infectious disease clinics should use break

Table 6.2.2 Domestic Water Consumption Quotas

No.	Water Use	Unit	Maximum Daily Consumption (L/d)	Hourly Variation Coefficient (K_h)
1	Outpatient patient	Person per visit	25~50	2. 5
2	Observation ward Patient	Bed per day	250~400	2. 0
3	Medical staff	Person per shift	150~300	1. 5~2. 0

tanks and booster pumps for water supply;

3 The water supply system shall be zoned for water supply according to clean areas, semi-contaminated areas, and contaminated areas. Backflow prevention measures shall be taken on the main water supply pipes for semi-contaminated and contaminated areas.

6.2.4 Domestic water pressurization equipment shall be located in the clean area instead of contaminated or semi-contaminated area.

6.2.5 All washbasin faucets shall use non-contact or non-manual switches and shall have measures to prevent sewage splashback. Urinals shall use sensor-operated automatic flush valves. Squat toilets should use foot-operated self-closing flush valves or sensor-operated automatic flush valves. Sitting toilets should use sensor-operated automatic flush valves.

6.3 Drainage

6.3.1 The outpatient department for infectious diseases shall adopt separate stormwater and sewage systems. When there is no municipal stormwater pipeline in the city, the hospital shall establish a separate stormwater pipeline system; surface runoff or open ditch discharge of stormwater should not be used.

6.3.2 Wastewater from infectious disease clinics shall not be used as a source for reclaimed water. Roof and surface stormwater shall not be reclaimed and reused.

6.3.3 Wastewater from infectious disease clinics shall be discharged separately from wastewater from other departments.

6.3.4 The layout of internal drainage pipes in the outpatient department for infectious diseases shall comply with the following provisions

1 Clean areas, semi-contaminated areas, and contaminated areas shall discharge drainage separately, and vent pipes shall be set up independently;

2 All drainage pipes shall be discharged separately to outdoor pre-disinfection facilities for treatment; pipes from different areas shall not be combined before pre-disinfection.

6.3.5 Vent pipes on roofs of infectious disease clinics shall have good ventilation conditions around them. The vent pipe outlet shall be disinfected before being connected to the air. The discharge outlet shall extend not less than 2 m above the roof. The distance from fresh air intake openings shall not be less than 4 m. Vent pipes shall not be connected to exhaust shafts or ducts of HVAC system.

6.3.6 Drainage pipes and vent pipes for public toilets in respiratory clinics shall be set up separately.

6.3.7 Connections between sanitary appliance drain outlets and drainage pipes, and between each drainage pipe, shall be sealed.

6.3.8 The drainage system for infectious disease clinics shall comply with the following provisions

1 Drainage pipes shall have standard slopes;

2 The pipe diameter for waste washing sinks and slop sinks shall not be less than 75 mm, and sealing measures shall be taken;

3 The diameter of drainage vertical pipes should be determined at 70% of the rated flow rate specified in the current national standard *Code for design of building water supply and drainage* (GB 50015).

6.3.9 The installation of floor drains in infectious disease clinics shall comply with the following provisions

1 Except for preparation rooms, soiled utility rooms, toilets, bathrooms, air conditioning equipment rooms, etc., where floor drains shall be installed, other rooms such as nursing stations, treatment rooms, consulting rooms, laboratories, and doctor's offices shall not have floor drains.

2 Floor drains shall use water-seal-less, straight-through type with filter screens plus trap seals. The water depth of trap seal shall not be less than 50 mm and not greater than 75 mm. Measures should be taken to ensure the floor drain trap seal is not broken. It is preferable to replenish the floor drain trap seal using water from a nearby washbasin drain. Bell-

type floor drains are prohibited.

3 If floor drains are required in places such as emergency rooms and equipment rooms, openable airtight floor drains shall be used.

6.3.10 The installation of trap seals and water seals in drainage systems shall comply with the following provisions

1 When sanitary appliances without built-in trap seals are connected to the drainage system, a trap seal shall be installed below the drain outlet. The trap seal water depth shall not be less than 50 mm and not greater than 100 mm;

2 Different sanitary appliances shall not share a trap seal, and water seals shall not be duplicated on the same drainage branch pipe;

3 Movable mechanical flaps are prohibited from replacing trap seals.

6.3.11 Drainage pipes shall undergo water tightness testing, and measures shall be taken to prevent sewage leakage and seepage from drainage pipes.

6.4 Hot Water

6.4.1 The domestic hot water quality of shall comply with the provisions of the current industry standard *Water quality standards for domestic hot water* (CJ/T 521).

6.4.2 Hot water consumption quotas should be determined according to Table 6.4.2.

6.4.3 The domestic hot water system pipelines for infectious disease clinics shall be set up separately from the hospital centralized hot water system pipelines.

6.4.4 The hot water system shall supply water by area. Hot water for semi-contaminated and contaminated areas should use decentralized supply. When using unit-type electric water heaters, the effective volume shall ensure stable water temperature and ease of adjustment.

6.4.5 The centralized hot water supply system shall apply mechanical circulation. The circulating return water temperature shall not be lower than 50℃, and corresponding sterilization measures shall be taken according to the system type.

6.4.6 The outlet temperature of domestic hot water heaters should be 60~65℃; scrub sink faucets in emergency rooms and operating rooms shall adopt constant temperature supply, with supply temperature preferably 25~30℃.

6.5 Drinking Water

6.5.1 Separate drinking water supply points shall be set up in each zone.

6.5.2 Drinking water systems may use water dispensers or electric water boilers. Public direct drinking water system shall not be used in contaminated areas.

6.6 Wastewater Treatment

6.6.1 The wastewater quality after treatment by the outpatient department for infectious diseases shall comply with relevant provisions of the current national standard *Discharge standard of water pollutants for medical organization* (GB 18466).

6.6.2 Wastewater treatment for infectious disease clinics shall comply with relevant provisions of the current national standard *Code for design of infectious diseases hospital* (GB 50849), the current industry standard *Technical specifications for hospital sewage treatment* (HJ 2029), and local environmental protection regulations.

6.6.3 Wastewater from semi-contaminated and contaminated areas shall enter pre-disinfection tanks for disinfection treatment before entering septic tanks, and then be properly and legally discharged after treatment at the hospital wastewater treatment station. The contact time in pre-disinfection tanks shall not be less than 0.5 hours.

6.6.4 Wastewater pre-disinfection facilities shall be located close to the outpatient department for

Table 6.4.2 Hot Water Consumption Quotas

No.	Water Use	Unit	Maximum Daily Consumption (L/d)	Hourly Variation Coefficient (K_h)
1	Outpatient patient	Person per visit	10~15	2. 5
2	Observation ward patient	Bed per day	130~200	2. 0
3	Medical staff	Person per shift	60~100	2. 5~2. 0

infectious diseases.

6.6.5 Wastewater disinfectants shall be discharged based on an effective chlorine dosage of 50.0 mg/L. The disinfectant contact time shall not be less than 1.5 hours, and the residual chlorine (as free chlorine) shall be greater than 6.5 mg/L.

6.6.6 Wastewater disinfectant charging equipment shall have a backup system.

6.6.7 Tail gas from wastewater pre-disinfection facilities shall be collected uniformly, disinfected, and discharged at high altitude.

7 Electrical

7.1 General Provisions

7.1.1 The electrical design for the outpatient department for infectious diseases shall integrate with the hospital conditions and comply with relevant provisions of current national standards *Code for design of general hospital* (GB 51039), *Standard for electrical design of civil buildings* (GB 51348), and *Code for electrical design of medical buildings* (JGJ 312).

7.1.2 The lighting design for the outpatient department for infectious diseases shall comply with relevant provisions of the current national standard *Standard for lighting design of buildings* (GB 50034).

7.2 Power Supply

7.2.1 The electrical load for equipment in fever clinics and wards, HVAC equipment maintaining negative pressure in wards, and other life-supporting medical equipment shall be classified as a critical load among Grade 1 loads. Other equipment loads within these areas shall be classified as a Grade 1 load. The load for fire protection and intelligent systems shall be classified consistent with that of the general hospital.

7.2.2 Dual power supply shall be adopted. The emergency power supply shall be an emergency diesel generator set or uninterruptible power supply (UPS).

7.2.3 The voltage total harmonic distortion of incoming power shall not exceed 2.6%, and the current total harmonic distortion shall not exceed 15%. The allowable voltage deviation for lighting is −2.5% to +5.0%.

7.3 Power Distribution System

7.3.1 The power supply for the outpatient department for infectious diseases shall be provided by dedicated circuits from the substation.

7.3.2 The outpatient department for infectious diseases should have independent electrical distribution rooms to distribute power to its different areas.

7.4 Wiring Installation

7.4.1 Electrical circuits within the outpatient department for infectious diseases shall be dedicated solely to electrical equipment within this treatment area; unrelated electrical circuits shall not enter or pass through.

7.4.2 Distribution conduits shall be installed using metal pipes; conduits passing through walls and floors shall have sleeves and be sealed with non-combustible materials.

7.4.3 Distribution conduits for rooms with negative pressure requirements should not cross pressure control zones; trunk-type wiring should be adopted, preferably installed between semi-contaminated and contaminated areas.

7.4.4 Cables shall be low-smoke, low-toxicity, halogen-free, and flame-retardant.

7.5 Electrical Lighting

7.5.1 The illuminance uniformity in outpatient departments shall not be lower than 0.7.

7.5.2 For various laboratories in outpatient departments, on a 0.75 m horizontal plane, the standard illuminance shall be 300 lx, the unified glare rating (UGR) shall not exceed 19, the uniformity of illuminance (U0) shall not be lower than 0.7, and the color rendering index (Ra) shall not be lower than 90.

7.5.3 Lighting in outpatient departments shall prioritize high-efficiency energy-saving luminaires, primarily using recessed sealed light strips. Light strips shall be arranged around the periphery of supply air outlets. Luminaires shall have anti-glare shades.

7.5.4 Germicidal lamps and other lighting luminaires

shall be controlled by separate switches, which shall be easily identifiable and operable.

7.6 Lightning Protection and Grounding

7.6.1 The lightning protection design for the outpatient department for infectious diseases shall comply with relevant provisions of current national standards *Design code for protection of structures against lightning* (GB 50057) and *Technical Code for Protection of Building Electronic Information System Against Lightning* (GB 50343).

7.6.2 The outpatient department for infectious diseases shall have an equipotential bonding (earthing) system.

8 Intelligent Systems

8.1 General Provisions

8.1.1 The intelligent system design for the outpatient department for infectious diseases shall comprehensively consider building function, technical and economic conditions, and relevant local requirements, and comply with relevant provisions of current national standards *Standard for Design of Intelligent Building* (GB 50314), *Code for design of general hospital* (GB 51039), *Standard for electrical design of civil buildings* (GB 51348), *General code for building electricity and intelligence* (GB 55024), and *Code for electrical design of medical buildings* (JGJ 312).

8.1.2 The intelligent systems for the outpatient department for infectious diseases shall be compatible with the overall intelligent system within the hospital. They should include security system, voice and data communication system, building environment management and building automation system, medical business information system, and medical item management system.

8.2 Security System

8.2.1 Video security surveillance in the outpatient department for infectious diseases shall cover public areas. The security system in each area shall be networked with the hospital-level security monitoring center. Cameras with facial recognition and body temperature detection functions, security checks, and personnel turnstiles should be installed at patient entrances. Turnstiles shall have QR code scanning.

8.2.2 Access control systems should be installed at external entrances/exits. Special areas should have double-door interlocks. Access control systems should use non-contact authentication methods such as card swiping or facial recognition.

8.2.3 Personnel trajectory tracking systems should be installed. Trajectory tracking cameras should be deployed at entrances/exits of various areas.

8.3 Voice and Data Communication System

8.3.1 Voice and data communication systems for the outpatient department for infectious diseases shall be integrated into the hospital's overall network for unified management. Their main lines should adopt optical fiber transmission.

8.3.2 The outpatient department for infectious diseases shall establish dedicated communication interfaces with superior centers for disease control and prevention and emergency command centers. They should provide necessary technical conditions for data sharing and business coordination between hospitals and centers for disease control and prevention.

8.3.3 Spaces such as self-service kiosk and vending machine shall be reserved in public areas of the outpatient department for infectious diseases. Space for self-service medication dispensing machines shall be reserved in the pharmacy.

8.4 Building Environment Management and Building Automation System

8.4.1 The building environment management and building automation system shall be installed in environment controlled zones within the outpatient department for infectious diseases.

8.4.2 The software and hardware of the building environment management and building automation system for the outpatient department for infectious diseases should be supplied as complete sets.

8.4.3 The building environment management and building automation system shall have emergency response plans and emergency response

operation modes to respond to various emergency command and dispatch instructions.

8.4.4 The building environment management and building automation system shall adopt an "integrated design for routine and epidemic situations".

8.4.5 The building environment management and building automation system shall use open system protocols, allowing data sharing and linkage with other intelligent systems, and shall comply with the following provisions:

1 It shall use common data transmission protocols, data transmission interface types, and database types;

2 It shall be compatible and interoperable with the hospital's upper-level system. Signals and power for terminal equipment shall comply with common industrial standards;

3 When interfacing with other building's intelligent systems, communication interfaces with those systems shall be configured.

8.4.6 The functions of the building environment management and building automation system shall comply with the following provisions

1 It shall possess functions of system self-diagnosis and automatic isolation of faulty components, automatic wake-up, fault alarm, manual/automatic switching, and automatic monitoring;

2 It shall possess functions of parameter out of limit alarm and protective action execution, and feedback action signals;

3 When the building automation system interfaces with other intelligent systems, communication interfaces with those systems shall be configured;

4 Controlled environment parameters and environment equipment shall be subject to closed-loop control.

8.4.7 When a building environment intelligent management system is installed, environmental monitoring and control parameters shall be determined based on infection risk levels and medical business needs, and shall comply with building equipment system design requirements. Indoor environmental parameters subject to monitoring or control should include the following:

1 Adjacent room air pressure difference;

2 Room ventilation frequency;

3 Air filter pressure drop;

4 Indoor temperature;

5 Indoor humidity;

6 Indoor airborne particulate concentration, etc.

8.4.8 The building environment management subsystem should possess all or part of the following functions according to hospital business needs

1 Setting and displaying gradient pressure difference values via interactive display control devices;

2 Building environment data collection, storage, and transmission;

3 Historical record archiving and retrieval for critical environmental parameters;

4 Alarm and recording for critical environmental parameter out of limit;

5 Alarm and recording for instrument and equipment failures;

6 Status indication for rooms such as isolation rooms and emergency rooms. Status identifiers shall include available/vacant, occupied, sterilizing, and closed;

7 Electronic logs for indoor cleaning and disinfection.

8.4.9 Building environment monitoring sub-stations should be set up at nursing stations or doctor duty rooms in clinics. Adjacent room air pressure difference shall be monitored in high-contamination and high-risk rooms such as isolation emergency rooms, isolation rooms, nucleic acid testing rooms, biochemical laboratories, radiology rooms, as well as in buffer rooms and protective clothing donning/doffing rooms at entrances/exits of different prevention/control level zones.

8.4.10 The building automation system should include building equipment monitoring and building

energy efficiency supervision.

8.4.11 The operation status of power supply systems for life support equipment should be monitored centrally online. The monitoring station shall display equipment status in real-time and have alarm functions.

8.5 Medical Business Information System

8.5.1 Self-service registration kiosks and payment kiosks should be installed. Self-service facilities should be of the contactless type. Queuing and call systems shall include electronic call screens, speakers, and self-service check-in kiosks.

8.5.2 An information guidance and release system should be installed, which may include intelligent guidance robots.

8.5.3 An infusion alarm system should be installed.

8.5.4 Intelligent and information systems should be interconnected and interoperable with the hospital-level information system for centralized management.

8.6 Medical Item Management System

8.6.1 Consumables management systems should be installed, supporting functions such as scanning for incoming/outgoing inventory, inventory warning, and report generation.

8.6.2 Medical waste traceability systems and bedding and clothing management systems should be installed, using artificial intelligence and Internet of Things to achieve real-time data supervision, full-process traceability, standardization, and normalization.

8.6.3 Unmanned self-service pharmacy equipment should be introduced in outpatient pharmacies.

8.7 Others

8.7.1 Remote consultation system and video conference system should be installed.

8.7.2 Two-way call/intercom systems should be installed in general wards. Two-way visual intercom systems should be installed in places such as isolation rooms. Intercom systems should be installed on both sides of pass-through windows in laboratories.

8.7.3 The clock system for the outpatient department for infectious diseases shall be integrated into the hospital clock system. Various intelligent systems should be synchronized with the clock system.

8.7.4 The medical gas system should have online centralized monitoring and alarm systems.

9 Medical Gases

9.0.1 Medical oxygen and medical compressed air used in the outpatient department for infectious diseases may share the central gas supply station with other areas. The outpatient department for infectious diseases shall have an independent medical vacuum suction system and the medical vacuum suction station shall be located in the contaminated area.

9.0.2 Other medical gases required by the outpatient department for infectious diseases may be provided as needed.

9.0.3 The calculation of medical gases, medical vacuum suction, and medical oxygen consumption for infectious disease clinics shall comply with relevant provisions of Appendix B, *Technical code for medical gases engineering* (GB 50751—2012).

9.0.4 The medical vacuum pump for the outpatient department for infectious diseases should use an oil-sealed rotary vane vacuum pump or an oil-free claw vacuum pump. The bacterial filter shall be installed at the vacuum pump suction inlet, and a spare filter shall be available. Exhaust gases from the medical vacuum pump shall be disinfected before being discharged into the air. Exhaust outlet shall not be located upwind of the medical air intake opening. The distance from the air conditioning and ventilation system air intake shall not be less than 20 m, and the height from ground level shall not be less than 5 m. Medical waste generated by the medical vacuum pump shall be uniformly disposed of according to national regulations.

9.0.5 Medical air compressors for the newly-built outpatient department for infectious diseases should adopt an oil-free model and shall have

a bacterial filter.

9.0.6 The medical gas pipelines for the outpatient department for infectious diseases shall comply with relevant provisions of the current national standard Technical code for medical gases engineering (GB 50751). When medical gases share gas sources with the whole hospital, pipelines should be separately branched from the gas source.

9.0.7 All medical gas pipelines shall undergo pressure testing and leak testing. Medical oxygen and medical compressed air pipelines shall undergo 10% radiographic inspection, with test result not lower than Level III.

9.0.8 The specification of the medical gas terminal shall be uniform with the hospital's.

9.0.9 The number of medical gas terminals in the outpatient department for infectious diseases shall comply with relevant provisions of Appendix A, *Technical code for medical gases engineering* (GB 50751—2012), and shall meet treatment needs during epidemics.

10 Innovative Technologies

10.1 Prefabricated Construction Technology

10.1.1 The newly-built outpatient department for infectious diseases should adopt prefabricated construction technology.

10.1.2 The prefabricated outpatient department for infectious diseases should adopt a system integration approach to coordinate design, production, transportation, construction, installation, use, and maintenance, achieving collaboration throughout the entire process.

10.1.3 The prefabricated outpatient department for infectious diseases shall adopt modular and standardized design, integrating structural systems, building envelope systems, equipment and pipeline systems, and interior finishing systems. Following integrated design principles, collaborative design shall be adopted for architecture, structure, water supply and drainage, HVAC, electrical, intelligent systems, and medical gases.

10.1.4 The prefabricated outpatient department for infectious diseases shall have full finishing. The interior finishing shall be designed integrally with structural systems, building envelope systems, and equipment and pipeline systems.

10.1.5 Technical planning shall be conducted for the prefabricated outpatient department for infectious diseases, including pre-assessment of technical selection, technical and economic feasibility, and constructability. Scientifically and reasonably determine construction objectives and technical implementation plans. Use green building materials and high-performance components to enhance overall building performance and quality.

10.1.6 The design of prefabricated partitions and wall finishes shall comply with the following provisions

1 The wall shall use surface finish materials with high scrubbing resistance, corrosion resistance, and durability, and meet sound insulation and fire resistance requirements;

2 Cleanroom-type aluminum profiles should be used for transitions at panel joints. Joints should be filled with anti-mold sealant.

10.1.7 For the renovation or expansion of the outpatient department for infectious diseases, the CT room and laboratory may be constructed in the form of a shelter or an integrated nucleic acid testing cabin.

10.2 Intelligent Equipment

10.2.1 The outpatient department for infectious diseases may selectively adopt an intelligent logistics system as needed to reduce personnel movement between different areas. However, measures should be taken to avoid contamination from contaminated area to clean area caused by the logistics system.

10.2.2 Spatial dimensions in all areas shall fully consider future intelligent development needs, reserving space for setting up, passage, parking, charging, disinfection, and maintenance of in-

telligent equipment.

Explanation of Wording in This Standard

1 To distinguish requirements with varying degrees of strictness when implementing the provisions of this standard, different wordings are adopted as explained as follows

1) Denoting a very strict requirement that must be complied with:
Positive wording uses “must”, negative wording uses “shall not/prohibited”;

2) Denoting a strict requirement that shall normally be complied with:
Positive wording uses “shall”, negative wording uses “shall not”;

3) Denoting allowing slight choice, meaning this is the preferred approach when conditions permit:
Positive wording uses “should”, negative wording uses “should not”;

4) Denoting having a choice, meaning this can be done under certain conditions, using “may” or “can”.

List of Normative References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document (including any amendments) referred to applies.

Code for design of building water supply and drainage (GB 50015)

Standard for lighting design of buildings (GB 50034)

Design code for protection of structures against lightning (GB 50057)

Standard for Design of Intelligent Building (GB 50314)

Technical Code for Protection of Building Electronic Information System Against Lightning (GB 50343)

Design Code for Heating Ventilation and Air Conditioning of Civil Buildings (GB 50736)

Technical code for medical gases engineering (GB 50751)

Code for design of infectious diseases hospital (GB 50849)

Code for design of general hospital (GB 51039)

Standard for electrical design of civil buildings (GB 51348)

General code for building electricity and intelligence (GB 55024)

Standards for drinking water quality (GB 5749)

Discharge standard of water pollutants for medical organization (GB 18466)

Code for electrical design of medical buildings (JGJ 312)

Water quality standards for domestic hot water (CJ/T 521)

Technical specifications for hospital sewage treatment (HJ 2029)