2010 Guidelines for Design and Construction of Healthcare Facilities

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About This Document

- Guidelines are developed through a consensus process similar to ANSI.
- Bringing together members of the Health Guidelines Revision Committee (HGRC) of the Facility Guidelines Institute, Inc. (FGI)
- HGRC is a group of 116 volunteers
  - Leading the HGRC is a Steering Committee, a group of 15 elected members that meet 12 times over the course of the four year revision cycle.
About This Document

- HGRC have subcommittees
  - Acoustic Design
  - Patient Handling and Movement
  - Surfaces
  - Oncology Treatment and Nursing Units
  - Critical Access Hospitals
  - Freestanding Birth Centers
Part 1 General
About This Document

- HGRC considers proposals for change reviewed from the public.
  - Planning, design and construction issues.
  - Proposed revisions are reviewed by the committee.
  - If approved they are published in the next edition.
- The publisher of this 2010 Edition is the American Society for Healthcare Engineers of the American Hospital Association.
1.1 - Introduction to the Guidelines

- Part 1
  - General-provides information applicable to all health care projects and facility types.
- Part 2
  - Hospitals-contains all of the chapters on hospitals
- Part 3
  - Ambulatory Care Facilities-contains chapters on a wide variety of outpatient facility types.
- Part 4
  - Residential Health Care Facilities-includes chapters on residential care facilities-nursing, hospice and assisted living.
1.1 - Introduction to the Guidelines

- Part 5
  - Other Health Care Facilities - contains chapters on other health care facility types that do not fall into the categories of Parts 2, 3 or 4. In this edition they are mobile, transportable, and re-locatable units; freestanding birth centers; and adult day health care facilities.

- Part 6
  - Ventilation of Heath Care Facilities
    - ASHRAE Standard 170-2008
Use with Other Codes

- These Guidelines address certain details of construction and engineering that are important for health care facility design and construction, but they are not intended to be all-inclusive, nor shall they be used to the exclusion of other guidance.
- Some projects may be subject to the regulations of several different jurisdictions, including local, state and federal authorities.
- Coordination efforts have been made; these Guidelines may not always be consistent with all applicable codes, rules and regulations.
- If requirements of these guidelines be conflicting or contradictory, the AHJ having primary responsibility for resolution should be consulted.
1.2 - Planning, Design, Construction and Commissioning

Physical Environment

- Water Features Inside the Facility
  - Limit human contact with the water
  - Allow for the application of water disinfection systems.
  - Materials should be resistant to chemical corrosion.
  - Exhaust ventilation should be provided directly above the water feature.
  - Aquariums should be enclosed to prevent patient or visitor contact with the water.
    - No exhaust ventilation is required.
1.2 - Planning, Design, Construction and Commissioning

- **Design Process and Implementation**
  - Interdisciplinary design team should be assembled as early as possible
  - The Design Team should include:
    - Administrators
    - Clinicians, Infection Preventionist
    - Safety Officers
    - Support Staff Patient Advocates/Consumers
    - A/E Consultants
    - Construction Specialists
1.2 - Planning, Design, Construction and Commissioning

- **Infection Control Risk Assessment (ICRA)**
  - The ICRA determines the potential risk of transmission of various air and waterborne biological contaminants in a facility.
    - The ICRA shall be a part of the project facility planning, design, construction and commissioning activities to support safe design, finishes, surfaces and HVAC/Plumbing Systems.
  - The ICRA shall be included early in the planning phase.
  - The ICRA team shall have the expertise in:
    - Infection prevention and control
    - Direct patient care
    - Facility design
    - Construction
    - HVAC and Plumbing Systems
1.2 - Planning, Design, Construction and Commissioning

- Infection Control Risk Assessment (ICRA) (continued)
  - The ICRA Considerations
    - Design Elements
      - Number, location and type
        - Airborne infection isolation and protective environment rooms.
      - Plumbed hand washing stations
        - Convenient and accessible for health care personnel and other users
      - Emergency fixtures.
      - Water systems to limit Legionella and waterborne pathogens.
1.2 - Planning, Design, Construction and Commissioning

- **Infection Control Risk Assessment (ICRA) (continued)**
  - The ICRA Considerations (continued)
    - Construction Elements
      - Impact of disrupting essential services to patients and employees.
      - Determine specific hazards and protection levels of each area.
      - Location of patients based on susceptibility to infection and determine the risk.
      - Movement of debris, traffic flow, spill cleanup.
      - Testing and certification of systems.
      - External and internal assessment of construction activities.
      - Location of known hazards.
1.2 - Planning, Design, Construction and Commissioning

- Infection Control Risk Mitigation Recommendations (ICRMR)
  - Prepared by the ICRA team.
  - Patient placement and relocation
    - Standards for barriers and other protective measures
    - Temporary provisions or phasing for construction or modification of water supply.
1.2 - Planning, Design, Construction and Commissioning

- **Design Considerations and Requirements**
  - Vibration Control and Isolation
    - Equipment
      - Fixed building equipment that rotates or vibrates, vibration control shall be considered.
      - Bases and supports provided per *ASHRAE Handbook.*
1.2 - Planning, Design, Construction and Commissioning

- **Design Considerations and Requirements (continued)**
  - Sustainable Design
    - Potable water quality and conservation
      - Evaluate potable water quality and conservation strategies in all phases of facility development or renovation.
      - Design for water conservation shall not adversely affect patient health, safety or infection control.
  - Bariatric-Specific Design Considerations
    - Toilet fixtures need to be floor mounted instead of wall hung.
      - Sink need to also be floor mounted as people usually lean on a sink and its surrounds while using the bathroom.
      - Toilets need to able to handle the weight of a the patient.
Design Considerations and Requirements (continued)

Provision for Disasters

- Facilities must remain operational in the aftermath of a disaster (hurricanes, tornadoes, flooding, earthquakes), special design is required to protect essential building services.
  - Power
  - Medical Gas Systems
  - Water

- Facilities should be designed to meet the requirement of ASCE/SEI 7 or the building codes.

- Seismic provisions.
1.2 - Planning, Design, Construction and Commissioning

- Renovation
  - Existing conditions and operations shall be documented prior to initiation of renovations and/or new construction projects.
  - Plumbing systems.
    - Medical gas/vacuum
    - Water
    - Treated Water
    - Sanitary
    - Storm
    - Fire Protection, detection and alarm systems
Health care facility maintenance personnel should be included in the commissioning process.

Owner needs to be assured that the following building and systems components, not just HVAC System, will function according to design intent.

- Plumbing
- Fire Protection/Suppression
- Alarm devices
- Medical gas systems
- Special plumbing equipment and systems should be certified to support the chemicals scheduled for use.
Commissioning (continued)

- **Plumbing Systems**
  - Water lines, taps, showers, and ice machines that have been disrupted or stagnant should be flushed before use by building occupants
    - Ice Machines – steps should be taken to prevent the use of stagnant ice or water.
    - Flushing Plumbing Systems – written procedures should be utilized before owner use. This should be part of the specifications.
Record Drawings and Manuals

After the completion of the building the owner should be provided with complete set of record documents:
- Fixed equipment
- Mechanical and electrical systems
- Known deviations from the construction documents.
- Drawings shall include a life safety plan for each floor reflecting NFPA 101 requirements.

Equipment Manuals

- A complete set of manufacturer’s operating, maintenance, and preventive maintenance instructions shall be provided.
- Parts list
- Operating staff should be provided with instructions on how to properly operate systems and equipment.
1.2 - Planning, Design, Construction and Commissioning

- Record Drawings and Manuals (continued)
  - Design Data
    - Owner shall be provided with complete design data for the facility, including the following:
      - Structural design loads of the Plumbing Equipment
      - Summary of heat loss assumption and calculations
      - Estimated water consumption
      - Medical gas outlet listing
      - List of applicable codes.
      - Electric power requirements of installed equipment.
1.3 - Site

- **General**
  - **Availability of Utilities**
    - Facilities shall be provided with reliable utilities
      - Water, gas and sewer.
  - **Water Supply**
    - Capacity to provide for normal water usage and to meet fire protection requirements.
  - **Outdoor Water Features**
    - Shall be equipped to safely manage water quality to protect the public from infectious or irritating aerosols.
  - **Environmental Pollution Control**
    - Mercury elimination in existing facilities. New health care facilities should not contain mercury-containing equipment (thermostats, switching device, etc.)
1.4 - Equipment

- **General**
  - **Drawings**
    - Include fixed and movable equipment that required building services.
    - Equipment utility location drawing showing all services.
    - Owner furnish equipment identified and services shown. Identify equipment NIC.
  - **Major Technical Equipment**
    - X-ray, imaging equipment, radiation therapy equipment, etc. have special mechanical previsions.
Part 2 Hospitals
2.1 - Common Plumbing Elements for Hospitals

- **General**
  - In the absence of local and state plumbing codes all plumbing systems shall be designed and installed in accordance with the *International Plumbing Code*.

- **Plumbing and Other Piping Systems**
  - All piping shall be identified.
  - All valves shall be tagged.
  - Valves schedule shall be provided to the facility owner.
  - No plumbing piping shall be exposed overhead or on walls where possible accumulation of dust or soil may create a cleaning problem or where leaks would create a potential for food contamination.
Plumbing and Other Piping Systems (continued)

- Hemodialysis/hemoperfusion piping (dialysis of the kidney)
  - A separate water supply and drainage facility that does not interfere with hand-washing shall be provided.
  - Consideration should be given to the disposal of liquid waste from the dialyzing process to prevent odor and backflow.
  - When the program includes hemodialysis, continuously circulated filtered cold water shall be provided.
    - Piping shall be in accordance with AAMI RD62 (Association for the Advancement of Medical Instrumentation)
    - If the dialysis equipment includes sufficient water treatment provisions, use of domestic cold water without special piping requirements shall be permitted
2.1 - Common Plumbing Elements for Hospitals

- Plumbing and Other Piping Systems (continued)
  - Potable water supply systems
    - Designed to have sufficient pressure to operate all fixtures and equipment.
    - Piping size based on fixture unit values.
    - Use a diversity factor when fixture unit value exceeds 1000 FU
    - Shut off valves provided for each fixture.
    - Access panels provided for valves.
    - Vacuum breakers devices provided on outlets connecting a hose or tubing to equipment.
    - No potable water storage tanks shall be intended for constant use, except as required for disaster preparedness.
    - Emergency fixtures shall be connected to potable water system.
2.1 - Common Plumbing Elements for Hospitals

- Plumbing and Other Piping Systems (continued)
  - Non-potable water supply systems
    - Clearly marked PVC purple piping
    - Rainwater supply
    - Recaptured condensate water
    - Graywater
  - Municipal reclaimed water systems.
    - May be used for drip irrigation or close-loop process applications where required or permitted by AHJs.
    - Close-loop process applications include cooling tower makeup, ground source heat pump loops, and cooling of heat rejection equipment (e.g. vacuum pumps, refrigeration equipment, etc.)
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing and Other Piping Systems (continued)**
  - Hot water systems
    - The water heater system shall have sufficient supply capacity
    - Recirculation systems shall be provided for hot water serving patient/resident care areas.
      - 25 feet is the maximum distance a fixture branch piping
    - Dead-end piping, risers with no flow are not permitted
      - Empty risers, mains and branches installed for future are permitted.
    - Storage of water at higher temperatures shall be permitted.
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing and Other Piping Systems (continued)**
  - Legionella in hot water systems
    - Provide provisions to limit the amount of legionella bacteria or opportunistic waterborne pathogens
      - Hyper chlorination
        - Free chlorine
        - Chlorine dioxide
        - Mono chloramine
      - Elevate the water temperature to 140°F
        - Easiest option
      - Ozone injection
      - Silver/copper ions
      - Ultraviolet light
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing and Other Piping Systems (continued)**
- **Drainage systems**
  - Do not route drainage piping over the following areas, if unavoidable use double containment piping for protection
    - Operating rooms
    - Delivery rooms
    - Nurseries
    - Food preparation centers
    - Food serving facilities
    - Food storage areas
    - Central services
    - Electronic data processing areas
    - Electrical closets
2.1 - Common Plumbing Elements for Hospitals

- Plumbing and Other Piping Systems (continued)
  - Drainage Systems (continued)
    - Floor Drains
      - No floor drains in operating and delivery rooms.
      - If floor drains are installed in cystoscopy the drain plate shall be located away from the operative site.
    - Kitchen Grease Traps
      - Capacity required.
      - Located and arranged outside for easy access for cleaning.
      - Not located in the food preparation space.
    - Plaster traps
      - Provide access for cleaning.
    - Autopsy Table Drainage
      - Designed to avoid splashing or overflow
      - Easy cleaning and flushing.
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing and Other Piping Systems (continued)**
- **Drainage Systems (continued)**
  - Condensate Drains
    - Cleaned without being disassembly
    - Provide air gap
    - Protect piping from freezing if located in that type of area
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing Fixtures**
  - **General**
    - **Material**
      - Non-absorptive and acid resistant
      - Spout clearances to avoid contaminating utensils
  - **Hand-washing stations**
    - Sinks shall have deep basins to prevent splashing
    - The area of the basins shall not be less than 144 sq. in. (minimum 9” width or length).
    - Basins shall be made of porcelain, stainless steel or solid surface materials.
    - The faucet spout shall be at least 10” above the bottom of the basin.
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing Fixtures (continued)**
  - Hand-washing stations (continued)
    - No forceful discharge brought on by the water pressure.
  - Special Requirements
    - One hand-washing station for every three beds in open plan areas
    - One hand-washing station in each patient room located near the entrance.

- **Showers and Tubs**
  - Non-slip walking surface
  - Soap dish recessed
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing Fixtures (continued)**
  - **Clinical Sinks**
    - Trim shall meet ADA and fixture shall be provided with an internal trap.
  - **Ice Machine**
    - Copper tubing for connection.
2.1 - Common Plumbing Elements for Hospitals

- **Plumbing Fixtures (continued)**
  - **Scrub Sinks**
    - Freestanding scrub sinks and lavatories used for scrubbing in procedure rooms shall be trimmed with foot, knee or ultrasonic controls.
    - Single-lever wrist blades are not permitted.
2.1 - Common Plumbing Elements For Hospitals

- **Plumbing Fixtures (continued)**
  - Medical Gas and Vacuum Systems
    - Provide outlets consistent with the program
    - See Table 2.1-6 (Part of handout)
    - Systems shall comply with NFPA 99
      - Testing and certification
    - Vacuum discharge located at least 25 feet from all outside air intakes, doors, and operable windows
Hybrid Operating Room
Cath Lab
Cath Lab

Hybrid OR
2.X Specific Requirements

The following facilities have similar plumbing requirements as “Common Elements for Hospitals” paragraph 2.1-8.4 Plumbing Systems

- 2.2 Specific Requirements for General Hospitals
- 2.3 Specific Requirements for Small Primary Care Hospitals
- 2.4 Specific Requirements for Critical Assess Hospitals

(Space reserve for future document)
2.5 – Specific Requirements for Psychiatric Hospitals

- **General**
  - The plumbing systems shall be designed and installed in accordance with chapters in the *International Plumbing Code* that are applicable.

- **Plumbing Fixtures**
  - Injury and suicide prevention shall be given to the following:
    - Showers (shower heads shall be flush mounted)
    - Bath
    - Toilets
    - Sinks
2.6 – Specific Requirements for Rehabilitation Hospitals and Other Facilities

Has the same plumbing requirements as “Common Elements for Hospitals”

- **General**
  - The plumbing systems shall be designed and installed in accordance with chapters in the *International Plumbing Code* that are applicable.

- **Drainage Piping**
  - Sinks used for acid waste disposal, connect to acid waste piping
  - Understand what equipment you are connecting to.
Room Photos
Critical Care Unit

Patient Room
Patient Room

Modular Toilet Rooms
Operating Room

Patient Room
Autopsy Room

Laboratory

Laboratory
The following facilities have similar plumbing requirements as “Common Elements for Hospitals” Section 2.1-8.4 and “Common Elements for Outpatient Facilities” Section 3.1-8.4

- **3.2 Specific Requirements for Primary Care Outpatient Centers**
- **3.5 Specific Requirements for Freestanding Urgent Care Facilities**
- **3.6 Specific Requirements for Freestanding Cancer Treatments Facilities**
  - No plumbing requirement mentioned with the exception of hand-wash stations, patient toilet rooms, staff toilet rooms and drinking water dispensing unit.
- **3.7 Specific Requirements for Outpatient Surgical Facilities**
3.1 – Specific Requirements for Outpatient Facilities

- **General**
  - These requirements do not apply to outpatient facilities that do not preform invasive procedures.
  - The plumbing systems shall be designed and installed in accordance with chapters in the *International Plumbing Code* that are applicable.

- **Plumbing and Other Piping Systems**
  - All piping shall be identified.
  - All valves shall be tagged.
  - Valves schedule shall be provided to the facility owner.
  - No plumbing piping shall be exposed overhead or on walls where possible accumulation of dust or soil may create a cleaning problem or where leaks would create a potential for food contamination.
Plumbing and Other Piping Systems (continued)

- Hemodialysis/hemoperfusion piping (dialysis of the kidney)
  - A separate water supply and drainage facility that does not interfere with hand-washing shall be provided.
  - Consideration should be given to the disposal of liquid waste from the dialyzing process to prevent odor and backflow.
  - When the program includes hemodialysis, continuously circulated filtered cold water shall be provided.
    - Piping shall be in accordance with AAMI RD62 (Association for the Advancement of Medical Instrumentation)
    - If the dialysis equipment includes sufficient water treatment provisions, use of domestic cold water without special piping requirements shall be permitted.
3.1 – Common Elements for Outpatient Facilities

- Plumbing and Other Piping Systems (continued)
  - Potable water supply systems
    - Designed to have sufficient pressure to operate all fixtures and equipment.
    - Piping size based on fixture unit values.
    - Use a diversity factor when fixture unit value exceeds 1000 FU
    - Shut off valves provided for each fixture.
    - Access panels provided for valves.
    - Vacuum breakers devices provided on outlets connecting a hose or tubing to equipment.
    - No potable water storage tanks shall be intended for constant use, except as required for disaster preparedness.
    - Emergency fixtures shall be connected to potable water system.
3.1 – Common Elements for Outpatient Facilities

- **Plumbing and Other Piping Systems (continued)**
  - Non-potable water supply systems (not mentioned in Section 3.1-8.4)
    - Clearly marked PVC piping
    - Rainwater supply
    - Recaptured condensate water
    - Graywater
    - Municipal reclaimed water systems.
      - May be used for drip irrigation or close-loop process applications where required or permitted by AHJs.
      - Close-loop process applications include cooling tower makeup, ground source heat pump loops, and cooling of heat rejection equipment (e.g. vacuum pumps, refrigeration equipment, etc.)
3.1 – Common Elements for Outpatient Facilities

**Plumbing and Other Piping Systems (continued)**

- Hot water systems (not mentioned in Section 3.1-8.4)
  - The water heater system shall have sufficient supply capacity
  - Recirculation systems shall be provided for hot water serving patient/resident care areas.
    - 25 feet is the maximum distance a fixture branch piping
    - Temperature is measured at the point of use or inlet to the equipment.
  - Dead-end piping, risers with no flow are not permitted
    - Empty risers, mains and branches installed for future are permitted.
  - Storage of water at higher temperatures shall be permitted.
3.1 – Common Elements for Outpatient Facilities

- Plumbing and Other Piping Systems (continued)
  - Legionella in hot water systems
    - Provide provisions to limit the amount of legionella bacteria or opportunistic waterborne pathogens
      - Hyper chlorination
        - Free chlorine
        - Chlorine dioxide
        - Mono chloramine
      - Elevate the water temperature to 140°F
        - Easiest option
      - Ozone injection
      - Silver/copper ions
      - Ultraviolet light
3.1 – Common Elements for Outpatient Facilities

- **Plumbing and Other Piping Systems (continued)**
- **Drainage systems (similar to Section 2.1-8.4)**
  - Do not route drainage piping over the follow areas, if unavoidable use double containment piping for protection
    - Operating rooms
    - Food preparation centers
    - Food serving facilities
    - Food storage areas
    - Central services
    - Electronic data processing areas
    - Electrical closets
3.1 – Common Elements for Outpatient Facilities

- **Plumbing and Other Piping Systems (continued)**
  - **Drainage Systems (continued) (similar to Section 2.1-8.4)**
    - **Floor Drains**
      - No floor drains in operating and delivery rooms.
      - If floor drains are installed in cystoscopy the drain plate shall be located away from the operative site.
    - **Kitchen Grease Traps**
      - Capacity required.
      - Located and arranged outside for easy access for cleaning.
      - Not located in the food preparation space.
    - **Plaster traps**
      - Provide access for cleaning.
3.1 – Common Elements for Outpatient Facilities

- Plumbing and Other Piping Systems (continued)
  - Drainage Systems (continued) (similar to Section 2.1-8.4)
    - Condensate Drains
      - Cleaned without being disassembly
      - Provide air gap
      - Protect piping from freezing if located in that type of area
3.1 – Common Elements for Outpatient Facilities

- **Plumbing Fixtures** (similar to Section 2.1-8.4)
  - General
    - Material
      - Non-absorptive and acid resistant
      - Spout clearances to avoid contaminating utensils
    - Hand-washing stations
      - Sinks shall have deep basins to prevent splashing
      - The area of the basins shall not be less than 144 sq. in. (minimum 9” width or length).
      - Basins shall be made of porcelain, stainless steel or solid surface materials.
      - The faucet spout shall be at least 10” above the bottom of the basin.
3.1 – Common Elements for Outpatient Facilities

- **Plumbing Fixtures (continued)** (similar to Section 2.1-8.4)
  - Clinical Sinks
    - Trim shall meet ADA and fixture shall be provided with an internal trap.
  - Ice Machine
    - Copper tubing for connection.
3.1 – Common Elements for Outpatient Facilities

- Plumbing Fixtures (continued) (similar to Section 2.1-8.4)
  - Scrub Sinks
    - Freestanding scrub sinks and lavatories used for scrubbing in procedure rooms shall be trimmed with foot, knee or ultrasonic controls.
    - Single-lever wrist blades are not permitted.
  - Eyewash Station
    - Provided per OSHA 29 CFR, 1910.151 and ANSI Z358.1 for station location.
3.1 – Common Elements For Outpatient Facilities

- **Plumbing Fixtures (continued)**
- **(similar to Section 2.1-8.4)**
  - Medical Gas and Vacuum Systems
    - Provide outlets consistent with the program
    - See Table 2.1-6 (Part of handout)
    - Systems shall comply with NFPA 99
      - Testing and certification
    - Vacuum discharge located at least 25 feet from all outside air intakes, doors, and operable windows
3.3 – Specific Requirements for Small Primary Care (Neighborhood) Outpatient Facilities

- **General**
  - Systems to meet the requirements of this section.
  - Comply with applicable codes
  - Free of leaks
  - Sufficient water pressure to operate fixtures and equipment
  - Provide proper backflow prevention on faucets (vacuum breakers)
  - Hot water to lavatories not to exceed 110°F
  - Provide proper piping insulation on the piping.
3.4 – Specific Requirements for Freestanding Outpatient Diagnostic and Treatment Facilities

- **General**
  - This section applies to the outpatient diagnostic and treatment facility that is separate from the acute care hospital that can accommodate a wide array of outpatient diagnostic services and minimally invasive procedures. Plumbing requirements are specific to the following procedures and must be reviewed on a case by case basis.

Cardiac Catheterization
General Radiography
Fluoroscopy
Mammography
CT Scanning
MRI’s

Ultrasound
Radiation Therapy
IV Therapies
3.1 - General (continued)

Follow the general requirements for outpatient facilities that are described below:

- 3.1-1 General
- 3.1-3 Diagnostic and Treatment Locations
- 3.1-4 Patient Support Services
- 3.1-5 General Support Services and Areas
- 3.1-6 Public And Administrative Areas
- 3.1-7 Design and Construction Requirements
- 2.2-3.6 Nuclear Medicine Services
3.8 Specific Requirements for Office Surgical Facilities

- **Plumbing Requirements**
  - Hand scrub station
    - On permitted to service two operating rooms
    - Permitted to meet hand-washing station requirements for immediately adjacent areas
  - Medical Gas
    - Must be supplied verify location and demand
3.9 – Specific Requirements for Gastrointestinal Endoscopy Facilities

- **Plumbing Systems**
  - Medical Gas and Vacuum Requirements
    - See Part 6 (ASHRAE 170) of document for mechanical system requirements and Table 3.1-1 (Station Outlet for Oxygen, Vacuum, and Medical Air in Outpatient Facilities).

- Requirements for Specific Locations
  - Oxygen and suction shall be provided for each patient cubical per Table 3.1-1
  - Procedure room – Station outlets for oxygen and vacuum shall be available.
  - Instrument processing room and decontamination area – Vacuum and non-medical compressed air shall be provided.
3.10 Specific Requirements for Renal Dialysis Centers

- **Plumbing Requirements**
  - **Disposal of Liquid Waste**
    - Liquid waste from the dialyzing process to prevent odor and backflow is a design consideration.
  
- **Hemodialysis Piping**
  - A separate water supply and drainage facility that does not interfere with hand-washing shall be provided.
  - Continuously circulated filtered cold water shall be provided.
  - Piping shall be in accordance with AAMI RD62 (Association for the Advancement of Medical Instrumentation)
  - If the dialysis equipment includes sufficient water treatment provisions, use of domestic cold water without special piping requirements shall be permitted
3.10 Specific Requirements for Renal Dialysis Centers

- **Plumbing Requirements (continued)**
  - Water Treatment
    - The water treatment equipment is required to be located in a separate enclosed room.
3.11 Specific Requirements for Psychiatric Outpatient Centers

- **Plumbing Requirements**
  - **Waiting Area**
    - Provisions for drinking water shall be available.
    - In shared facilities drinking water may be outside the outpatient area.
3.12 Specific Requirements for Outpatient Rehabilitation Facilities

- **Plumbing Requirements**
  - **Drainage Systems**
    - A dedicated sink or floor drain for portable hydrotherapy whirlpool.
    - Whirlpool cannot be drained in a sink or lavatory.
    - Shower if required by the program.
  - Hand-washing station
  - Clinical sink if required by the program
Part 4 Residential Health Care Facilities
4.x - Specific Requirements

The following facilities have similar plumbing requirements as “Common Elements for Residential Health Care Facilities” Section 4.1-8.4

- 4.2 Specific Requirements for Nursing Facilities
- 4.3 Specific Requirements for Hospice Facilities
- 4.4 Specific Requirements for Assisted Living Facilities
**General**
- These requirements do not apply to outpatient facilities that do not preform invasive procedures.
- The plumbing systems shall be designed and installed in accordance with chapters in the *International Plumbing Code* that are applicable.

**Plumbing and Other Piping Systems**
- All piping shall be identified.
- All valves shall be tagged.
- Valves schedule shall be provided to the facility owner.
- No plumbing piping shall be exposed overhead or on walls where possible accumulation of dust or soil may create a cleaning problem or where leaks would create a potential for food contamination.
Plumbing and Other Piping Systems (continued)

- Hemodialysis/hemoperfusion piping (dialysis of the kidney) (similar to Section 3.1-8.4)
  - A separate water supply and drainage facility that does not interfere with hand-washing shall be provided.
  - Consideration should be given to the disposal of liquid waste from the dialyzing process to prevent odor and backflow.
  - When the program includes hemodialysis, continuously circulated filtered cold water shall be provided.
    - Piping shall be in accordance with AAMI RD62 (Association for the Advancement of Medical Instrumentation)
    - If the dialysis equipment includes sufficient water treatment provisions, use of domestic cold water without special piping requirements shall be permitted.
4.1 – Common Elements for Residential Facilities

- **Plumbing and Other Piping Systems (continued)**
  - Potable water supply systems (similar to Section 3.1-8.4)
    - Designed to have sufficient pressure to operate all fixtures and equipment.
    - Piping size based on fixture unit values.
    - Use a diversity factor when fixture unit value exceeds 1000 FU.
    - Shut off valves provided for each fixture.
    - Access panels provided for valves.
    - Vacuum breakers devices provided on outlets connecting a hose or tubing to equipment.
    - No potable water storage tanks shall be intended for constant use, except as required for disaster preparedness.
4.1 – Common Elements for Residential Facilities

**Plumbing and Other Piping Systems (continued)**
- Non-potable water supply systems (similar to Section 3.1-8.4)
  - Clearly marked PVC piping
  - Rainwater supply
  - Recaptured condensate water
  - Graywater
- Municipal reclaimed water systems.
  - May be used for drip irrigation or close-loop process applications where required or permitted by AHJs.
  - Close-loop process applications include cooling tower makeup, ground source heat pump loops, and cooling of heat rejection equipment (e.g. vacuum pumps, refrigeration equipment, etc.)
Plumbing and Other Piping Systems (continued)

Hot water systems (similar to Section 3.1-8.4)
- The water heater system shall have sufficient supply capacity
- Recirculation systems shall be provided for hot water serving patient/resident care areas.
  - 25 feet is the maximum distance a fixture branch piping
  - Temperature is measured at the point of use or inlet to the equipment.
- Dead-end piping, risers with no flow are not permitted
  - Empty risers, mains and branches installed for future are permitted.
- Storage of water at higher temperatures shall be permitted.
4.1 – Common Elements for Residential Facilities

- **Plumbing and Other Piping Systems (continued)**

- Legionella in hot water systems (not mentioned in Section 3.1-8.4)
  - Provide provisions to limit the amount of legionella bacteria or opportunistic waterborne pathogens
  - Hyper chlorination
    - Free chlorine
    - Chlorine dioxide
    - Mono chloramine
  - Elevate the water temperature to 140°F
    - Easiest option
  - Ozone injection
  - Silver/copper ions
  - Ultraviolet light
Plumbing and Other Piping Systems (continued)

- Drainage systems (similar to Section 3.1-8.4)
  - Do not route drainage piping over the following areas, if unavoidable use double containment piping for protection
    - Operating rooms
    - Food preparation centers
    - Food serving facilities
    - Food storage areas
    - Central services
    - Electronic data processing areas
    - Electrical closets
4.1 – Common Elements for Residential Facilities

- **Plumbing and Other Piping Systems (continued)**
  - **Drainage Systems (continued) (similar to Section 3.1-8.4)**
    - **Floor Drains**
      - No floor drains in operating and delivery rooms.
      - If floor drains are installed in cystoscopy the drain plate shall be located away from the operative site.
    - **Kitchen Grease Traps**
      - Capacity required.
      - Located and arranged outside for easy access for cleaning.
      - Not located in the food preparation space.
    - **Plaster traps**
      - Provide access for cleaning.
4.1 – Common Elements for Residential Facilities

- **Plumbing and Other Piping Systems (continued)**
  - Drainage Systems (continued) (similar to Section 3.1-8.4)
    - Condensate Drains
      - Cleaned without being disassembly
      - Provide air gap
      - Protect piping from freezing if located in that type of area
4.1 – Common Elements for Residential Facilities

- **Plumbing Fixtures** (similar to Section 3.1-8.4)
  - **General**
    - **Material**
      - Non-absorptive and acid resistant
      - Spout clearances to avoid contaminating utensils
    - **Hand-washing stations**
      - Sinks shall have deep basins to prevent splashing
      - The area of the basins shall not be less than 144 sq. in. (minimum 9” width or length).
      - Basins shall be made of porcelain, stainless steel or solid surface materials.
      - The faucet spout shall be at least 10” above the bottom of the basin.
4.1 – Common Elements for Residential Facilities

- **Plumbing Fixtures (continued) (similar to Section 3.1-8.4)**
  - **Clinical Sinks**
    - Trim shall meet ADA and fixture shall be provided with an internal trap.
  - **Ice Machine**
    - Copper tubing for connection.
Plumbing Fixtures (continued)

(similar to Section 2.1-8.4)

Medical Gas and Vacuum Systems

- Provide outlets consistent with the program
- See Table 2.1-6 (Part of handout)
- Systems shall comply with NFPA 99
  - Testing and certification
- Vacuum discharge located at least 25 feet from all outside air intakes, doors, and operable windows
Part 5 Other Health Care Facilities
5.1 Mobile, Transportable, and Re-locatable Units

- **Explanation of Units**
  - **Mobile Unit**
    - Any trailer or self-propelled unit equipped to be moved with a chassis on wheels and intended to provide medical services on a temporary basis.
  - **Transportable Unit**
    - Any pre-manufactured structure of trailer equipped with a chassis on wheels that is intended to provide medical services on an extended temporary basis.
  - **Re-locatable Unit**
    - Any structure not on a chassis or wheels that is built to be relocated at any time and to provide medical services.
5.1 Mobile, Transportable, and Re-locatable Units

- **Plumbing Systems**
  - General
    - If provided, water and sanitary lines to and from the unit shall be protected from freezing.
    - If provided, backflow prevention shall be installed at the point of the water connection to the mobile unit.
    - Piping Systems shall be installed in accordance with applicable model plumbing codes, unless specified within these guidelines.

- Plumbing Venting
  - Mobile Units – venting is not required to penetrate the roof for mobile units requiring a sink. It is permitted to vent through the sidewalls or other acceptable locations.
  - Transportable and Re-locatable Units – venting is required to penetrate the roof per code.
5.1 Mobile, Transportable, and Re-locatable Units

- **Plumbing Systems (continued)**
  - Water Supply Connection
    - Backflow prevention shall be installed at the point of water connection to unit.
  - Waste Connection
    - Waste line shall be designed and constructed to discharge into the facility sanitary sewage system.
  - Medical Gas and Vacuum
    - If installed shall be in accordance with NFPA 99.
5.2 Freestanding Birth Centers

- **Plumbing Systems**
  - Medical Gas Outlets
    - Rooms shall have oxygen and vacuum per the requirements of Table 3.1-1.
    - Portable equipment is permitted
    - Design in accordance with NFPA 99
5.2 Adult Day Health Care Facilities

- **Plumbing Requirements**
  - Communal activity areas shall have convenient access to a hand-washing station.
  - One dedicated staff toilet room is required.
  - Shower or bathtub area shall be provided.
  - Provision for drinking water shall be provided.
  - Hot water temperature shall not exceed 110°F.
Part 6 Ventilation of Health Care Facilities
6.1 Ventilation of Health Care Facilities

This guidelines has incorporated ASHRAE Standard 170 into this Guidelines
What is wrong with these pictures?
FYI: All of these plumbers are thankfully no longer in business. They have been sadly elected to public office.

Should have measured twice!
And the purpose of the door is? To keep out the flies.

OOPS! Forgot to check the length of the faucet spout.
Oak seat is a nice touch. New concept for Middle Eastern plumbing to accommodate the Americans

Huh @#$%!
Apparently you don’t want anyone seeing your face but the rest of you is okay?

This is considered to be a half bath in the real estate listing.
This stall is for people that have arms line an Organutan.

How does this even get pass the planning phase or code official's.
A new meaning of “The Throne”. Very Classy
Video
• All p-traps are deep seal 8” to 10”. The only 4” p-trap is at water closets because is part of the fixture.
• Bio-vent released through a HEPA filters.
• The sterilizer chamber was directly connected into the bio-waste system because it was located outside the containment barrier.
• The sterilizer chamber evacuation into the drain was at 40 to 60 cfm.
• The HEPA Filters had a pressure drop of 5” to 7” of W.C. during the chamber evacuation.
• The evacuation took the path of less resistance which was the 4” water closet p-trap and blow water out of the water closet.

The Fix:
Tap a ½” stainless pipe into the direct drain line from the chamber and routed it inside the high containment space at the exhaust hood located above the sterilizer. This relieved some pressure.
Exercise