ASHRAE/ASHE Guideline 43P

Public Review Draft

Operations Guideline for Ventilation of Health Care Facilities

Third Public Review (November 2024)
(Draft shows Proposed Independent Substantive Changes to Previous Public Review Draft)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

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[Note to Reviewers: This public review draft makes proposed independent substantive changes to the previous public review draft. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Table of Contents:

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

Health care organizations are challenged to meet a series of unclear and sometimes conflicting heating, ventilating, and air-conditioning (HVAC) standards and guidelines established by a variety of professional organizations. Making the situation more difficult is that some standards like ASHRAE/ASHE 170, Ventilation of Health Care Facilities, are design standards that do not apply to operations but are applied as an operational standard by authorities having jurisdiction. Also complicating the issue is the enforcing of differing versions of the various standards at different instances in the building lifespan.

When hospital and ambulatory care organizations are surveyed by state agencies, Centers for Medicare & Medicaid Services (CMS), and other accrediting organizations, misunderstandings about the major difference between building and engineering design standards and operational practice guidelines have led to a great deal of confusion and even conflict in the health care physical environment. Guideline 43 was created in a collaborative effort between ASHRAE and the American Society for Health Care Engineering (ASHE) with the intent of addressing the often-inconsistent practice of applying HVAC design standards to operational practices in health care facilities.

The intent of Guideline 43 is to provide an operational guideline for health care facilities that will work in collaboration with the design standard ASHRAE/ASHE 170, Ventilation of Health Care Facilities, which has been adopted by reference by the Centers for Medicare & Medicaid Services. First and foremost the Guideline 43 Project Committee (GPC 43) focused on patient, staff, and visitor safety and how to best enhance a healing environment. It is the intent of the Guideline to provide guidance to operating personnel, thus providing consistency in the operation of health care ventilation systems.

The purpose of the Guideline is to address health care HVAC systems as a comprehensive whole while also providing consistency in the maintenance and operations of these systems. The Guideline encourages the optimization of HVAC systems and the resources they use through the application of a maintenance program along with the appropriate application of alternative equipment maintenance and reliability-centered maintenance practices.

The Guideline covers the implementation of a ventilation management program plan through defining the responsible party, the minimum elements of a maintenance program along with providing guidance on legacy systems, condition indicators, excursion variations, and program improvement opportunities.

The Guideline recommends a ventilation management program based on the risk of harm categorized as either critically or non-critically ventilated spaces. Operation practices within the Guideline are based on a continuous and consistent balance of day-to-day unscheduled outages or repairs, scheduled regulatory and maintenance needs, ongoing building rehabilitation and construction projects, and long-term visioning and capital planning. Finally, the Guideline lists the recommended inspection and maintenance tasks for ventilation systems within health care facilities.

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3 DEFINITIONS

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condition indicators: descriptions and measures of the physical characteristics and delivery performance of equipment. The described characteristics and performance are outcomes of operation and maintenance work. Actual outcomes, when compared to the desired standard, serve to measure the effectiveness of the systems and equipment condition and performance, and the effectiveness of the maintenance program. These are developed by responsible party (owner) in collaboration with the maintenance providing party. (Informative Note: For example, the amount of rust on interior surfaces of an air handler is a measure of a physical characteristic, and when compared to a desired standard, such as new condition, establishes the condition of the asset. The air volume flow rate of the air handler compared to ~~design rate~~ desired standard is an indicator of a performance characteristic.)

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maintenance plan: document that defines the level of effort for performing inspection and maintenance work required to support the facility's requirements for a given time period. The maintenance plan systematically establishes planning, organizing, and control for the inspection and maintenance work to be accomplished within resource limits. The maintenance plan includes the list of inspection and maintenance tasks, schedule for performing these tasks, method, and measures for evaluating work performance, and desired results for the systems and equipment and maintenance program.

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Ventilation Management Program Plan (VMP): the overarching philosophy, management, and organization structure required to achieve the goals and requirements established for the facility and its occupants. As part of the organization's utility management program the VMP explains how maintenance will be executed and managed to preserve the condition and capability of the HVAC systems and equipment to enable delivery of the intended thermal comfort, energy efficiency, and indoor air quality required for the facility. The program ~~shall~~ should include an inventory of equipment to be inspected and maintained, a listing of space functions, ranges of temperatures and humidity for space functions, pressurization criteria, unoccupied turndown parameters, excursion and variance criteria, and a process for periodic program review and evaluation.

4 Operating Practices

Operating Practices: A facility leader and their team should continuously and consistently balance at minimum day-to-day unscheduled outages or repairs, scheduled regulatory and maintenance needs, ongoing building rehabilitation and construction projects, and long-term visioning and capital planning. Broadly described as operating practices, the following are baseline practices for ~~ensuring~~ optimal performance.

4.1 Reference and Planning Documents

4.1.1 The Responsible party and their team need to understand, and be able to easily share, how the various HVAC systems apply to that facility. Typically, there are collections of construction record documents provided by contractors associated with various expansion and renovation projects at the conclusion of the project. Over time, these documents often

overlap and can be difficult to decipher what is currently in place. Therefore, "consolidated" or "master" files are critical.

- Record files
  - Facility record documents ("as-builts")
  - Commissioning Systems Manual(s)
  - O&M manuals
  - Warranties
- Consolidated/Master Files
  - Zone maps - areas covered by air handling systems (supply, return, and exhaust depending on system-type and complexity), and terminal boxes/thermostats
  - *Ventilation Management Program Plan (VMP)*
    - ~~Similar to the Water Management Plan t~~This should consist of a multidisciplinary committee that meets periodically to discuss current ventilation trends, areas of new construction, and space changes.

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4.2 Facility leaders and their teams are part of a larger hospital team. The ability and methodology to accurately convey capabilities and responsibilities in both normal and emergency conditions needs to be established and maintained. Construction or maintenance is a significant impact to the function of the hospital and puts hospital staff and patients at a greater risk. As such, well understood policies and guidelines are needed. Finally, they need to accurately assess the needs of the facility, internally or with external support, to provide financial leadership with an evolving capital plan for replacing significant pieces of equipment.

- Normal Operations
  - Service level agreements, environmental conditions [Temperature, Relative Humidity, Pressure, Air Changes per Hour], responsiveness
  - Communication – with operation, maintenance and clinical staff; modes and methods
  - Ventilation Management Program Plan
- Emergency Operations
  - (cross talk with the other emergency group)
- Construction or maintenance guidelines or policies
  - Interim Life Safety Measure (ILSM)
  - Pre-construction Risk Assessment (PCRA)
  - Infection Control Risk Assessment (ICRA)
- Infrastructure Capital Planning - lifecycle of ventilation systems
  - Air handlers
  - Boilers
  - Chillers
  - Cooling Towers
  - Building Management System

4.3 One aspect of healthcare facility operation that makes it unique is for most hospitals the ongoing surveys that occur to confirm not only the facility HVAC but all aspects of care are appropriate. Accreditation surveyors such as The Joint Commission, DNV, CMS validation, local and state fire

marshal surveys, insurance surveys, and internal mock surveys all require the facility leader to have an accurate picture of their facility performance and provide documentation as requested.

- ~~Inspection/Verification Documentation~~
  - ~~Testing, Adjusting and Balancing (TAB) reports for critical spaces such as operating rooms, isolation rooms, etc.~~

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5. Monitored Spaces

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~~**5.3** Facilities development of routine testing and verification of these parameters should be based on category [critical, non-critical], manufacturer requirement, system function, system reliability, and risk-based approaches.~~

5.4 Classification of Spaces

5.4.1 Critically Ventilated Spaces. Those areas used for invasive or high-risk procedures, infection control isolation, or any space where loss of required air flow, temperature, relative humidity, and/or pressure relationships could result in harm, injury or death to patients, visitors or staff.

5.4.2 ~~Non-Critically~~Generally Ventilated Spaces. Those areas not used for invasive or high-risk procedure areas, not used for infection control isolation, and where loss of required air flow, temperature, humidity, and/or pressure relationships would not result in harm, injury or death to patients, visitors or staff.

5.5 Verification of Space Conditions

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5.5.1.1 Prescribed frequencies. Space environmental conditions should be ~~physically~~ verified for pressure relationship, temperature, relative humidity, and airflow according to the frequencies described in Table~~s~~ 5.1 ~~through 5.4~~. Methods to measure these conditions should follow industry accepted guidelines and practices. If it is determined that *control indicators* are not within ranges established within the *VMP* Section 4.8 Excursion Variations should be followed.

5.5.1.2 Risk-based management approach. Under the risk based management approach, testing and verification frequency should be based on reliability factors and facilities risk of failure. RCM [Reliability Centered Maintenance] analysis of system aids in addressing which assets for maintenance should be targeted.

Based on this engineering approach, facilities should examine recommended frequency of testing in listed tables to determine if adjustments are needed based on the following:

1. Patient outcome impacts
2. Criticality of asset/equipment
3. Age of equipment
4. Risk of failure based on equipment type
5. Manufacturer requirements
6. Frequency of preventative maintenance performed
7. Allocation/availability of spare parts and repair
8. Past history of failure

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Table 5.1: ~~Pressure~~ Testing Frequency

Function of Space(s)	Testing frequency for Temperature, Humidity, and Pressure [a]
AII Room, PE Room, Combination AII/PE Room, Operating Room, Operating/surgical cystoscopic rooms, Critical care patient care, Neonatal intensive care, Wound intensive care (burn unit), Class 2 & 3 Imaging rooms, Pharmacy Services: Pharmacy Areas (USP-regulated), Sterile storage room (clean/sterile medical/surgical supplies), Cesarean Delivery room	Daily or as determined by the VMP
Continued care nursery, Newborn nursery, Nursery workroom, Emergency department public waiting area, Emergency department trauma/resuscitation room, Emergency service triage area, Labor/delivery/recovery (LDR), Labor/delivery/recovery/postpartum (LDRP), Laser eye room, Patient room, Phase 1 PACU and Phase II recovery, Radiology waiting rooms, Seclusion room, Treatment Room, Class 1 imaging room, Dialysis treatment area, General examination room, Hydrotherapy, Physical therapy, Special examination room, Treatment room, ECT procedure room, Nuclear medicine hot lab, Instrument processing room, Procedure room, Intermediate care patient room, Bronchoscopy, sputum collection, and pentamidine administration, Gastrointestinal endoscopy procedure room, Pharmacy Services: Pharmacy Areas (non-USP regulated)	Semiannually or as determined by the VMP
Laboratory work areas (all), Food and supply storage, Food preparation areas, Toilet Room, Clean assembly /workroom, Soiled workroom/decontamination room, Autopsy room, Clean linen storage room, Nonrefrigerated body holding room, additional spaces identified within the VMP. [b]	Annually or as determined by the VMP

a. Accuracy of sensors should be verified as determined within the VMP.b. Not all spaces must be identified within the VMP.

~~Function of Space~~	~~Baseline Pressure Testing Frequency*~~
~~Operating room, Operating/surgical cystoscopic rooms, Delivery rooms (caesarean), Procedure room, X-ray (surgery/critical care & catheterization), ED Trauma room, Neonatal Intensive Care, Wound Intensive Care (Burn Unit), Combination AII/PE room, PE room~~	~~Weekly~~
~~Airborne Infection Isolation (AII) room, Bronchoscopy, sputum collection, & pentamidine administration, ED Trauma/Resuscitation Room, Laser Eye Room, Triage Room, Anterooms, Clean workroom, Clean Supply Room,~~	~~Monthly~~

~~Clean Linen Storage, Sterile storage room, Laboratory work area media transfer, Pharmacy Services~~	
~~Emergency Department Decontamination, Autopsy Room, Non-Refrigerated body holding room, Instrument Processing Room~~	~~Annually~~
~~Emergency Department public waiting room, Medical/anesthesia gas storage, Radiology waiting, Toilet rooms, Darkroom, Dialyzer reprocessing room, Instrument Processing, Hydrotherapy, Laboratories, Nuclear medicine hot lab, Physical therapy, Sterilizer equipment room, Decontamination room, Bedpan room, Environmental Services Room, Laundry processing room, Linen and trash chute room, Soiled linen sorting and storage, Warewashing, Hazardous material storage, Regulated waste holding, Soiled workroom or soiled holding~~	~~Change of Use~~

~~* Frequencies listed are based on the room being occupied for its intended purpose. If the room is occupied for another purpose, i.e. an Airborne Infection Isolation Room being used for a non-contagious patient, then the frequency should be based on the current usage.~~

~~Table 5.2: Humidity Testing Frequency~~

~~Function of Space~~	**~~Humidity Testing Frequency~~**
~~Wound intensive care (burn unit)~~ ~~Operating room, Operating/surgical cystoscopic rooms, Delivery rooms (caesarean), Procedure room, GI Endoscopy Procedure Room~~ ~~X-ray (surgery/critical care & catheterization), Airborne Infection Isolation (AII) room, Combination AII/PE room, PE room~~ ~~Critical and intensive care, Recovery room, Treatment room, Continued care nursery, Newborn nursery suite, Laser eye room, Newborn intensive care, Trauma room (crisis or shock)~~ ~~Patient room, Labor/delivery/recovery (LDR), Labor/delivery/recovery/postpartum (LDRP), Intermediate Care, Emergency Department exam/treatment room, X-ray (diagnostic & treatment), General examination room, Special examination room, Triage, Treatment room, Physical therapy, ECT procedure room, Emergency Department public waiting room, Radiology Waiting Rooms, Medication room, Clean workroom, Sterile storage room~~	~~Daily~~

~~Table 5.3: Temperature Testing Frequency~~

~~Function of Space~~	**~~Baseline Temperature Testing Frequency~~**

~~Operating room, Operating/surgical cystoscopic rooms, Delivery rooms (caesarean), GI Endoscopy Procedure Room, Bronchoscopy, sputum collection, & pentamidine administration~~ ~~X-ray (surgery/critical care & catheterization)~~ ~~Wound intensive care (burn unit), PE room, Airborne Infection Isolation (AII) room, Combination AII/PE room, , Procedure room~~ ~~Patient room, Critical and intensive care, Intermediate Care, Recovery room, Labor/delivery/recovery (LDR), Labor/delivery/ recovery/postpartum (LDRP), Emergency Department exam/treatment room, General examination room, Special examination room, Treatment room, Medication room~~ ~~Continued care nursery, Newborn nursery suite, X-ray (diagnostic & treatment), Dialysis treatment area, ECT procedure room, Food preparation center, Dietary storage~~ ~~Sterile storage room~~ ~~Decontamination room~~ ~~Autopsy Room, Clean workroom~~ ~~Emergency Department public waiting room, Labs, Nuclear medicine treatment room, Nuclear medicine hot lab, Radiology Waiting Rooms, Trauma room (crisis or shock), Triage, Non-refrigerated body holding room, Laser eye room~~ ~~Newborn intensive care, Physical therapy, Hydrotherapy, Clean linen storage~~	~~Daily or Response to Complaint~~

~~**Table 5.4: Airflow Testing Frequency**~~

~~**Function of Space**~~	~~**Baseline Air flow Testingflow Testing Frequency**~~
~~Operating room, Operating/surgical cystoscopic rooms, Delivery rooms (caesarean)~~	~~Annual~~
~~PE room, Airborne Infection Isolation (AII) room, Combination AII/PE room, Wound intensive care (burn unit)~~	~~Triennial~~
~~X-ray (surgery/critical care & catheterization), Procedure room, Bronchoscopy, sputum collection, & pentamidine administration, GI Endoscopy Procedure Room, Decontamination Room, Clean workroom, Sterile storage room~~	~~Change of use~~

6 - IMPLEMENTATION

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6.3 ***Ventilation Management Program Plan (VMP).*** There ~~shall~~should be a *ventilation management program plan* that preserves the capability of the HVAC systems to provide the intended thermal comfort, energy efficiency, and indoor air quality required for the healthcare facility and documents the needed HVAC requirements for each space. The *VMP* should include *condition indicators* by space

function such as temperature ranges, humidity ranges, pressure relationships, unoccupied turndown application, etc.

At a minimum, the *VMP* ~~shall~~should contain the elements in Section 6.3.1 through Section 6.3.3.

Informative Note: Informative Appendix F provides nine steps to developing a *ventilation management program plan* (*VMP*).

6.3.1 Inventory of Items to be Inspected and Maintained. HVAC systems and equipment that impact thermal comfort, energy efficiency, and indoor air quality ~~shall~~should be listed in an equipment inventory of items to be inspected and maintained. This list should include at least the manufacturers' information, location, capacity, maintenance program identifier (if applicable), and other data agreed upon by the responsible party and implementing party.

6.3.2 Maintenance Plan. A plan of inspection and maintenance work should be developed. The maintenance plan ~~shall~~should document the work to be accomplished at scheduled intervals on the inventory of equipment to be maintained. The maintenance plan ~~shall~~should be developed specifically for the size, design, scope, criticality, and complexity of the systems and equipment serving the facility. The plan ~~shall~~should describe required tasks, the frequency of tasks, and task schedule, identify the party responsible for performing the task, and specify the authorizing party, task completion, documentation procedure, plan monitoring procedures, and procedures for evaluation and feedback. The plan may include the information described in Sections 6.3.2.1 through 6.3.2.4.

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6.3.2.3 *Condition Indicators.* *Condition indicators* for systems and equipment ~~shall~~should be developed. These indicators are measurements or observations of physical *condition* and delivery of thermal comfort, indoor air quality, and energy efficiency that are learned during the performance of the related inspection tasks and compared to the guideline recommendations. The comparisons serve to determine the level of degradation and subsequent responsive action.

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6.5 Revision of the *VMP*. The *VMP* ~~shall~~should be capable of continuous improvement. Improvement in this context ~~shall~~should be manifest when changes in equipment *condition* or status, changes to the facility, changes to space functions, or acquisition of new maintenance technology warrant review and revision of the maintenance plan. The intent of the guideline is to enable tasks and/or frequencies to be changed to deliver proper *preservative action* in response to actual conditions.

Informative Note: Informative Appendix C lists situations that suggest a review of the maintenance plan.

6.5.1 Degradation of *Condition* and *Performance*. Degradation of equipment *condition* or *performance* that is observed while performing scheduled inspection and maintenance tasks or on other occasions ~~shall~~should be documented.

6.5.2 Response to Discovery of Unacceptable Conditions. Upon initial discovery or observation of the degraded state, the situation ~~shall~~should be resolved through appropriate corrective or *preservative action*. If *preservative action* cannot resolve the degraded status, then further action outside the scope of this guideline may be required.

6.6 Operational Air Changes per Hour, Temperature, Relative Humidity and Pressure Relationships. The baseline recommendations of this guideline should be ~~followed~~ considered by the multidisciplinary committee for air changes per hour, temperature, pressure relationship, and relative humidity in both legacy systems and newly designed spaces. ASHRAE/ASHE 170 *Ventilation of Health Care Facilities* is a design standard. ASHRAE 170 is not an operational standard, even though some of its design criteria imply or state operational requirements.

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6.6.2 New Systems/Spaces

6.6.2.1 For newly designed systems and spaces, the HVAC ventilation system shall be able to operate at the minimum design criteria of ASHRAE/ASHE Standard 170 *Ventilation of Health Care Facilities* during normal hours, with excursions following section 4.8 of this guideline. Unoccupied turndown is also acceptable. If the owner or staff desires modified criteria, such as additional air changes per hour, wider temperature ranges, or narrower relative humidity criteria, the *VMP* ~~shall~~should be updated to reflect the modified *condition indicators* provided the systems are capable of achieving them.

Informative Note: ASHRAE/ASHE 170 *Ventilation of Health Care Facilities* provides a relative humidity range of 20-60% for operating rooms. If staff desire, they may establish a range of 45-55%. The system is capable of meeting the less stringent requirement of 20-60%. After updating the *VMP*, this more stringent Rh range is acceptable.

Informative Note: ASHRAE/ASHE 170 *Ventilation of Health Care Facilities* provides a design temperature range of 68-75F for operating rooms. If staff desire, they may establish a modified range of 64-78F. The system is capable of meeting the less modified range of 68-75F. After updating the *VMP*, this more stringent temperature range is acceptable.

Informative note: For pharmacies, please refer to the appropriate United States Pharmacopeial Convention (USP) standard. Commonly used standards are USP 795 for nonsterile compounding, USP 797 for sterile compounding, and USP 800 for hazardous drug handling in healthcare settings. Coordination with pharmacy leadership in the organization should be done for specific reference standards."

6.7 Unoccupied Turndown. Where allowed in ASHRAE/ASHE 170 *Ventilation of Health Care Facilities* and where a risk assessment allows, unoccupied turndown can be a significant energy savings and should be incorporated wherever feasible. Documentation in the VMP ~~shall~~should include, but not be limited to, spaces where unoccupied turndown applies, occupied and unoccupied setting for air change

rates, temperature range, relative humidity (where applicable), and pressurization (where applicable), as well as time before unoccupied mode initiates, override methodology, schedule (specific hours or whenever there is not occupancy), and time required to resume occupied mode.

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6.8.1 Relative Humidity (Rh) Excursions. When the upper Rh limit is exceeded, the *Decision and Response Team* (DRT) and Infection Prevention & Control (IP&C) should be notified and consider the following responses or the alternate protocols documented in the *VMP*. The *DRT* members will vary based on the space involved, e.g. perioperative, invasive procedure, main sterile storage in Sterile Processing Department (SPD), etc. Suggested actions ~~Actions~~ to be considered ~~take include~~ could be but are not limited to:

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Table 6.8.1 Thresholds for Response to Temporary Increase in Rh

Relative humidity ≤5% over upper limit		Relative humidity >5% over upper limit
> 6 hours continuously	> 12 hours continuously	> 4 hours continuously
• Facility engineer will take *corrective action* and adjust the mechanical system to bring the Rh down within acceptable range. • Notify manager and/or designee of the respective departments (i.e., Period and IP&C) that efforts are underway to correct the humidity. • When resolved, notify the manager and/or designees of the respective departments • Assure documentation on date/time of return to design specifications is retained.	• Facility engineer will take *corrective action* and notify the leader or designee of the respective departments of the involved space. • The leader or designee will convene with the key stakeholders to complete a risk assessment for the environmental conditions and make decisions as to continuing use of the space, relocate care to another space with compliant conditions or cancel care services until the issue is resolved. • Consider factors described in ~~4.6.1.5~~6.8.1.5 during the evaluation. • If leader or designee decides to continue with care in the effected space, the following measures must be taken. o Limit traffic	• Facility engineer will take *corrective action* and notify the leader or designee of the respective departments. • The leader or designee and key stakeholders will convene to complete a risk assessment for the environmental conditions and make decision as to continued use of the space, relocation of care or cancel care services until the issue is resolved. • Consider factors described in ~~4.6.1.5~~6.8.1.5 during the evaluation. • Assure documentation of date/time of return to design specifications is retained

	○ Monitor for accumulation of condensation ○ Perform terminal cleaning after the case. ○ Assure documentation of date/time of return to design specifications is retained.	

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Table 6.8.2 Thresholds for Response to Temporary Decrease in Rh

Relative humidity up to 5% below lower limit		Relative humidity <5% below lower limit
> 6 hours continuously	> 12 hours continuously	> 4 hours continuously
• Facility engineer will take *corrective action* and adjust the mechanical system to bring the Rh up within acceptable range. • Notify manager and/or designee of the respective departments that efforts are underway to correct the humidity. • When resolved, notify the manager and/or designee • Assure documentation on date/time of return to design specifications is retained.	• Facility engineer will take *corrective action* and notify the leader or designee of the respective departments. • The leader or designee will convene with key stakeholders to complete a risk assessment for the environmental conditions and decide to proceed or move the procedure to a location with compliant conditions if possible until the issue is resolved. • Implement high fire risk interventions • Consider factors described in ~~4.6.1.5~~6.8.1.5 during the evaluation.	• Facility engineer will take *corrective action* and notify the leader or designee of the respective departments. • The leader or designee will convene with key stakeholders to complete a risk assessment for the environmental conditions and decide to proceed or move the procedure to a location with compliant conditions if possible until the issue is resolved. • Consider factors described in ~~4.6.1.5~~6.8.1.5 during the evaluation.

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6.8.3.1 Variations in pressure relationships that exceed short term durations, as defined by the multidisciplinary committee, that cause a reversal in pressure relationships that exceed a short duration the following steps should be taken:

a. Facility engineer should take *corrective action* and adjust the mechanical system to bring the pressurization back to normal.
b. Notify manager and/or designee of the respective departments that efforts are underway to correct the pressurization.
c. When resolved, notify the manager and/or designee

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6.13.2 End Review. The end review ~~shall~~should consist of comparing maintenance program results with the program objectives and *condition indicators*. The responsible party and the implementing party ~~shall~~should review the measurements and observations collected during the evaluation period. The actual results shall be compared to the *VMP* desired outcomes, and HVAC systems performance. The comparison shall serve to evaluate the *VMP* performance. This information should be used to develop a plan for improving the *VMP*. Program improvement actions should be mutually agreeable between the responsible party and the implementing party.

~~7 Baseline Inspection and Maintenance Tasks~~

~~This section lists the baseline inspection and maintenance tasks for any facility to which this guideline applies. Organizations should modify the frequency of inspection task, if warranted by analysis and identification of acceptable or unacceptable conditions as listed in Sections 6.9 and 6.10. The continued application of building management systems and computer maintenance management systems provides for advanced monitoring and verification of *condition indicators* throughout a facility. While the baseline recommendations listed in the tables within this section are indicative of a more manual process the use of *BMS* and other automated methods is encouraged and can provide a more reliable and proactive response to excursions from established *condition indicators*. The *VMP* should document monitoring and verification process for monitored spaces.~~

~~Table 7-1: Air Distribution Systems~~

~~(Includes Ductwork, Grilles, Registers and Diffusers, Insulation and Duct Lining)~~

~~Task ID~~	~~Inspection Task~~	~~Maintenance Task~~	~~Frequency*~~	~~*Corrective Action*~~
~~a~~	~~Check control system and devices for evidence of improper operation.~~	~~Clean, lubricate, repair, adjust.~~	~~Annually~~	~~Replace or recalibrate components to ensure proper operation.~~
~~b~~	~~Inspect grilles, registers, and diffusers for dirt accumulation.~~	~~Clean as needed to remove dirt build up.~~	~~Annually~~	~~Replace if missing or damaged.~~
~~c~~	~~Check damper for *condition*, setting, and operation.~~	~~Clean, lubricate, repair, replace, or adjust as needed to ensure proper operation.~~	~~Semiannually~~	~~Replace if missing or damaged.~~
~~d~~	~~Inspect areas of moisture accumulation for biological growth.~~	~~If present, clean.~~	~~Annually~~	~~Disinfect as needed.~~

e	Inspect exposed ductwork for insulation and vapor barrier integrity.	Record damage locations.	Annually	Replace or repair if needed.
f	Inspect internally lined ductwork until the first turn or up to 20 ft (6.1 m) from a potential moisture source, such as a supply plenum, from air handler, outdoor air damper, humidifier, etc. for water damage and/or biological contamination.	Determine and record source of moisture.	Annually	Eliminate moisture source. Repair/replace wet insulation. Remove biological contamination and disinfect surfaces.

Table 7-2: Air Handlers
(Includes coils in the air handlers)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a1	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation based on pressure drop	Dependent on pressure drop	Evaluate frequency of change requirement.
a2	Check for particulate accumulation on filters.	If not based on pressure drop	Based on historical data	
b	If installed check ultraviolet lamp.	Clean and verify that it is functioning.	Semiannually	Replace according to MIFU or as needed to ensure proper operation.
c	Check P-trap.	Prime as needed to ensure proper operation.	Quarterly	Replace damaged P-trap.
d	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Semiannually	Disinfect as needed.
e	Check steam system traps, condensate pumps, strainers, and controls.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
f	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair, recalibrate or replace components as needed to ensure proper operation.
g	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
h	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually or detected with fault issues or user complaints	Repair, replace, or restore as needed to ensure proper operation.
i	Check for damage or evidence of leaks on the refrigeration cycle indoor heat exchanger, chilled-water coil heat exchanger, or steam or hot water coil heat exchanger surfaces.	Record location of identified leaks.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.

k	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
l	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
m	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
n	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
o	Check integrity of all panels on equipment.	Replace fasteners as needed to ensure proper integrity and fit/finish of equipment.	Annually	Repair or replace damaged panels.
p	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
q	Check for fin damage and evidence of fouling on the refrigeration cycle indoor heat exchanger, chilled-water coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable condition.	Annually	Repair or replace as needed to ensure proper operation.
r	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
s	Check damper for condition, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
t	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
u	Inspect exposed ductwork for insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table 7-3: Boilers
(including condensing, boiler stack, superheaters and heat recovery boilers)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	For systems using fuel oil, inspect fuel filter.	Clean, and verify proper operation.	Monthly	Repair or replace as needed to ensure proper operation.
b	Perform chemical testing of system water.	Verify water treatment target levels are being maintained.	Weekly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
c	For systems using fuel oil, check fuel pump for proper operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
d	Inspect blowdown or drain valve. Clear all debris to ensure proper operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
e	Check for evidence of leakage of fuel supply, heat transfer fluid, and flue gas.	Record location of identified leaks.	Quarterly	Repair or replace as needed to ensure proper operation.

f	For systems using natural gas, check gas pressure, gas valve operation, and combustion fan operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
g	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
h	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair or replace as needed to ensure proper operation.
i	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	Check for evidence of buildup or fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair, replace, or restore as needed to ensure proper operation.
k	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
l	Check combustion chamber, burner, and flue for deterioration, moisture problems, condensation, and combustion products.	Clean, and adjust combustion process for proper operation.	Annually	Repair or replace as needed to ensure proper operation.
m	Inspect refractory for damage or wear.	Clean combustion-side e.g., fire tubes, upper and lower drums. Record location of refractory damage or wear.	Annually	Repair or replace as needed to ensure proper operation.
n	Observe burner flame at high load for correct clearance from refractory.	Clean and adjust.	Annually	Repair or replace as needed to ensure proper operation.
o	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-4: Chillers - Absorption

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for the presence of noncondensable. Note and log purge count.	Adjust vacuum-pump purge time as needed to ensure noncondensable removal level.	Weekly	Repair or replace as needed to ensure proper operation.
b	Perform chemical testing of system water.	Treat as needed to ensure water chemistry and freeze protection target levels are being maintained.	Monthly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
c	Check steam system traps, condensate pumps, strainers and controls.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
d	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
e	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as	Semiannually	Repair, replace, or restore as needed

		needed. Clean or replace air filter.		to ensure proper operation.
f	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
h	Check for fouling, corrosion, or degradation.	Clean as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check open drive couplings, bearings, and seals for evidence wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
k	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
l	Check inhibitor and internal fluid chemistry.	Correct inhibitor and internal fluid chemistry if outside of established operating ranges.	Annually	Repair or replace as needed to ensure proper operation.
m	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-5: Chillers—Air-Cooled

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed to ensure water chemistry and freeze protection target levels are being maintained.	Quarterly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
c	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
d	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed to ensure proper operation.
e	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.

f	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
h	Check refrigerant system pressures and/or temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
i	Check open drive couplings, bearings, and seals for evidence of wear or alignment problems.	Lubricate and adjust, and record evidence of wear.	Annually	Repair or replace as needed to ensure proper operation.
j	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
k	Check for fin damage and evidence of fouling on the outdoor refrigeration cycle heat exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
l	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
m	Check for damage or evidence of leaks on the outdoor refrigeration cycle heat- exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration cycle heat- exchanger surfaces.
n	Check low ambient head pressure control sequence for evidence of improper operation.	Clean and adjust components or modify software/algorithm to ensure proper operation.	Annually	Repair or replace as needed to ensure proper operation.
o	Check compressor oil level and/or pressure on refrigerant systems having oil level and/ or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.

Table 7-6: Chillers—Water-Cooled
(Include provision for water-side economizers)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed to ensure water chemistry and freeze protection target levels are being maintained.	Monthly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
b	Inspect gearbox for excessive wear.	Clean, lubricate, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
d	Check variable frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as	Annually	Repair, replace, or restore as needed

		needed. Clean or replace air filter.		to ensure proper operation.
e	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
f	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Check refrigerant system pressures and/or temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
h	Check open drive couplings, bearings, and seals for evidence wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
j	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
k	Check compressor oil level and/or pressure on refrigerant systems having oil level and/ or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
l	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.

Table 7-7: Coils and Radiators
(Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check ultraviolet lamp.	Clean and verify that it is functioning.	Semiannually	Replace as needed to ensure proper operation.
b	Check for proper operation of control valves and vents.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
c	Check P-trap.	Prime as needed to ensure proper operation.	Quarterly	Replace damaged P-trap.
d	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed to ensure proper operation.
e	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
f	Check refrigerant system temperatures.	When outside of recommended levels,	Annually	Repair, and adjust refrigerant to

		find and record location of identified leaks.		achieve optimal operating levels.
g	Check for damage or evidence of leaks on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*. Record location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.
h	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
j	Check for fin damage and evidence of fouling on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
k	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
l	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-8: Condensing Units
(Split System exterior component. Indoor/Evaporator section in "Delivery")

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
b	Check fan belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
c	Check variable frequency drive for proper operation.	Correct as needed. Clean housing & tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed to ensure proper operation.
d	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
e	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
f	Check refrigerant system temperatures.	When outside of recommended levels,	Annually	Repair, and adjust refrigerant to

		find and record location of identified leaks.		achieve optimal operating levels.
g	Check refrigerant system pressures or temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
h	Check for fin damage and evidence of fouling on the outdoor refrigeration-cycle heat- exchanger surfaces.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Check open drive couplings, bearings, and seals for evidence of wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.
k	Check low ambient head pressure control sequence for proper operation.	Clean and adjust components or modify software/algorithm to ensure proper operation.	Annually	Repair or replace as needed to ensure proper operation.
l	Check compressor oil level and/or pressure on refrigerant systems having oil level and/or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Annually

Table 7-9: Control Systems
(includes sensors and actuators not in spaces. Does not include controls integral to equipment)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	For pneumatic systems, check compressed-air system (e.g., compressor, dryer, receiver, blowdown valve) for proper operation. Check for evidence of oil carryover and *condition* of oil filter.	Clean and lubricate as needed.	Monthly	Repair or replace as needed to ensure proper operation.
b	For pneumatic systems, check for proper air pressure.	Clean, lubricate, adjust.	Monthly	Repair or replace as needed to ensure proper operation.
c	For systems designed specifically for humidity control, measure relative humidity.	Clean, lubricate, adjust.	Quarterly	Repair or replace as needed to ensure proper operation.
d	Check alarms and alarm history.	Note and respond as required.	Quarterly	Repair or replace as needed to ensure proper operation.
e	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
f	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair, recalibrate or replace components as needed to ensure proper operation.
g	Check fan-belt tension, check for belt wear, and check sheaves for	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed

	evidence of improper alignment or evidence of wear.			to ensure proper operation.
h	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	For pneumatic systems, check pneumatic lines for blockages.	Clean as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
k	Check to see that backup of digital control program is current.	Update when it is not current.	Annually	Repair, replace, or restore as needed to ensure proper operation.
l	Check battery backup and verify proper operation.	Clean and maintain batteries as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
m	Verify actuator movement and device response to control output.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
n	Change *building management system* (BMS) interface user authentication passwords.	Make the change.	Annually	Repair, replace, or restore as needed to ensure proper operation.
o	Verify no *equipment* has been left in override (hand/OFF instead of auto) either locally or through the BMS	Make corrections as required.	Monthly	Repair, replace, or restore as needed to ensure proper operation.
p	Simulate an alarm *condition* in the system, which normally notifies personnel via email or text message, to confirm proper operation	Restore as required.	Annually	Repair, replace, or restore as needed to ensure proper operation.

Table 7-10: Cooling Towers and Evaporative-Cooled Devices

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed to ensure water chemistry and freeze protection target levels are being maintained.	Monthly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
b	Check conductivity and other sensors for proper readings.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
c	For systems designed specifically for humidity control, measure relative humidity.	Clean, lubricate, adjust.	Quarterly	Repair or replace as needed to ensure proper operation.
d	Check water system ultraviolet lamp.	Clean and verify that it is functioning.	Quarterly	Replace as needed to ensure proper operation.
e	Inspect blowdown or drain valve.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.

f	Check cooling-tower fan open drive system couplings, bearings, and seals for wear and proper alignment.	Lubricate and align as needed.	Quarterly	Repair, replace, or restore as needed to ensure proper operation.
g	Check fan belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Quarterly	Replace belts and sheaves as needed to ensure proper operation.
h	Check for fouling, corrosion, degradation, or dirt/debris accumulation on or in sump and strainer, wet decks, fill, nozzles, and exterior louvers.	Clean and restore as needed to ensure acceptable *condition*.	Quarterly	Repair or replace as needed to ensure proper operation.
i	If two-stage (dual flow rate) tower, verify proper operation at both high and low flow rates.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
j	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
k	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed to ensure proper operation.
l	Inspect pumps and associated electrical components.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
m	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
n	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
o	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
p	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
q	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
r	Check for proper damper operation.	Clean, lubricate, repair, replace, or adjust as needed to ensure proper operation.	Annually	Replace if missing or damaged
s	Check cooling tower motors and pumps for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed to ensure proper operation.

Table 7-11: Dehumidification and Humidification Devices
(Utility", as it may exist inside a unit. However, some are closer to the delivery point, so considering "Distribution" here.)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check ultraviolet lamp.	Clean and verify that it is functioning.	Quarterly	Replace as needed to ensure proper operation.
b	For systems designed specifically for humidity control, measure relative humidity.	Clean, lubricate, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
c	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
d	Check steam system traps, condensate pumps, and controls.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
e	Check for fouling, corrosion, or degradation.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair, replace, or restore as needed to ensure proper operation.
f	Check strainers.	Correct as needed. Clean housing, and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Inspect distributors, drain pans, and other areas of moisture accumulation for biological growth.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.

Table 7-12: Economizers—Air Side

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Monthly	Evaluate frequency of change requirement.
b	For communicating economizers only, check, review, and document alarms.	Reset resolved alarms	Quarterly	Repair, adjust, or replace components to ensure proper operation.
c	For communicating economizers only, check *condition*, setting, and operation of all related sensors.	Clean, lubricate, adjust.	Semiannually	Repair, adjust, or replace components to ensure proper operation.
d	Check *condition*, setting, and operation of the economizer controller and actuators.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
e	Check dampers for *condition*, setting, and operation.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
f	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	For all economizers, check *condition*, setting, and operation of all related sensors against a trusted sensor.	Clean, lubricate, adjust.	Annually	Repair, adjust, or replace components to ensure proper operation.
h	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure	Annually	Repair or replace damaged panels.

		proper integrity and fit/finish of *equipment*.		
i	Inspect areas of moisture accumulation for biological growth.	If present, clean.	Annually	Disinfect as needed.
j	Check *condition*, setting, and operation of the low-limit stat.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
k	Check *condition*, setting, and operation of the relief dampers or power exhaust fan.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-13: Engines - Microturbines

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check oil level and pressure.	Add and adjust as needed.	Monthly	Repair, replace, or restore as needed to ensure proper operation.
b	Inspect fuel filter.	Clean or replace as needed.	Monthly	Repair, replace, or restore as needed to ensure proper operation.
c	Check for particulate accumulation on turbine intake air filters.	Clean or replace as needed.	Monthly	Repair, replace, or restore as needed to ensure proper operation.
d	Inspect flexible connections.	Clean as needed.	Quarterly	Repair, replace, or restore as needed to ensure proper operation.
e	For systems using fuel oil, check fuel pump for proper operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
f	Check control box for dirt, debris, and/or loose terminations.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
g	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
h	Check open drive couplings, bearings, and seals for evidence of wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check exhaust system for corrosion.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
j	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed to ensure proper operation.
k	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.

Table 7-14: Fan (e.g., Exhaust, Supply, Transfer, Return)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.

b	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed to ensure proper operation.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
d	Check fan drive for problems due to poor alignment or poor bearing seating.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
e	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
f	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
g	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
h	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/finish of *equipment*.	Annually	Repair or replace damaged panels.
j	Inspect exposed ductwork and external piping for insulation and vapor barrier integrity.	Record location of damage.	Annually	Repair or replace as needed.
k	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
l	Inspect flexible connections.	Clean as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.

Table 7-15: Fan Coils—Hot-Water, and Steam Unit Heaters
(Limited to storage and warehousing, mostly associated with integrity verification)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check ultraviolet lamp.	Clean and verify that it is functioning.	Quarterly	Replace as needed to ensure proper operation.
c	Check P-trap.	Prime as needed to ensure proper operation.	Quarterly	Replace damaged P-trap.
d	Check steam system traps, pumps, and controls.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
e	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.

f	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
g	Check for damage or evidence of leaks on the refrigeration-cycle indoor heat exchanger, chilled-water coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*. Find and record the location of identified leaks.	Semiannually	Repair or replace as needed to ensure proper operation.
h	Check air-filter fit and housing seal integrity.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
i	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
k	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
l	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
m	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
n	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
o	Check for proper fluid flow.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair, and adjust to achieve optimal operating flows.
p	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
q	Check for fin damage and evidence of fouling on the refrigeration-cycle indoor heat exchanger, chilled-water coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
r	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
s	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
t	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-16: Furnaces—Combustion Unit Heaters
(Limited to storage and warehousing, mostly associated with integrity verification)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on air filters.	Clean or replace as needed to ensure proper operation.	Monthly	Evaluate frequency of change requirement.
b	For systems using fuel oil, inspect fuel filter.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
c	For systems using fuel oil, check fuel pump for proper operation.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
d	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
e	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
f	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
h	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
i	Check fan drive for problems due to poor alignment or poor bearing seating.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
j	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
k	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
l	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
m	Check combustion chamber, burner, and flue for deterioration, leaks, moisture problems, condensation, and combustion products.	Clean, and adjust combustion process for proper operation. Find and record the location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.
n	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed to ensure proper operation.
o	Check for damage or evidence of leaks on the gas heat section heat-exchanger surfaces.	Clean as needed. Find and record the location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-17: HVAC Water Distribution Systems

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed to ensure water chemistry and freeze protection	Monthly	Repair *equipment*, and treat as needed to ensure proper water chemistry.

		target levels are being maintained.		
b	Check chemical injector device.	Verify water treatment target levels are being maintained.	Annually	Repair *equipment*, and treat as needed to ensure proper water chemistry.
c	Check make-up water system for pressure and operation.	Clean and adjust as needed.	Semiannually	Repair, replace, or restore as needed to ensure proper operation.
d	Vent air from system high points. Check for proper fluid flow, and check piping for leaks.	When leaking, or when outside of recommended flow range, find and record the location of identified leaks.	Quarterly	Repair, replace, or restore as needed to ensure proper operation.
e	Inspect pumps and associated electrical components.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
f	Check for evidence of fouling on the water- cooled heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Check strainers.	Correct as needed. Clean housing, and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed to ensure proper operation.
h	Inspect external piping insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.
i	Check freeze stats, relief valves, flow and float switches, low water cutoffs, and other safety devices for proper operation	Clean, lubricate, adjust. Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
j	Check for visible leaks at gaskets & plate assemblies	inspect gaskets and plates for defects/debris	Semiannually	valve off piping to plate and frame heat exchangers, clean or replace gaskets
k	Check for visible leaks at shell and coil side of heat exchanger	inspect piping assemblies for coils and gasket *condition* at shell	Semiannually	Replace gaskets as needed, repair or replace entering/leaving pipe assemblies

Table 7-18: Indoor Section Duct-Free Splits
(Condenser (outdoor unit) is in "Utility". Includes Indoor Section Duct-Free Splits. Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed to ensure proper operation.
c	Check P-trap drain.	Prime as needed to ensure proper operation.	Semiannually	Replace damaged P-trap.

d	Check air filter fit and housing seal integrity.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
e	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat- exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*. Record location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.
f	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
g	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
h	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
j	Check for proper fluid flow.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
k	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
l	Check for fin damage and evidence of fouling on the indoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
m	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-19: Outdoor-Air Heat-Exchanging Systems
(includes Enthalpy wheels and ERVs, as well as "Outdoor-Air Heat-Exchanging Systems")

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Monthly	Evaluate frequency of change requirement.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
c	Check P-trap drain.	Prime as needed to ensure proper operation.	Semiannually	Replace damaged P-trap.
d	Check fan belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
e	Check for proper operation of heat exchanger.	Clean, and adjust to ensure proper operation.	Semiannually	Repair or replace components as

				needed to ensure proper operation.
f	Check for proper operation of enthalpy device.	Clean, and adjust to ensure proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.
g	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Semiannually	Disinfect as needed.
h	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Semiannually	Repair or replace as needed to ensure proper operation.
i	Check *condition*, setting, and operation of damper motors.	Adjust and lubricate as necessary.	Semiannually	Repair or replace as needed to ensure proper operation.
j	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
k	Check control box for dirt, debris, and/or loose terminations.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
l	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
m	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
n	Assess field-serviceable bearings.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
o	Inspect exposed ductwork for insulation and vapor barrier integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table 7-20: Package Terminal Air Conditioners/Heat Pumps (PTACs/PTHPs)
(Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check condensate slinger and/or drain system.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed to ensure proper operation.
d	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the	Annually	Repair and adjust to achieve optimal operating flows.

		location of identified leaks.		
e	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
f	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
h	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
i	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
j	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
k	Check for fin damage and evidence of fouling on the indoor refrigeration cycle heat- exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
l	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
m	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
n	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.
o	Check for evidence of fouling on the outdoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
p	Inspect areas of moisture accumulation for biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
q	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.

Table 7-21: Pumps

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Semiannually	Repair, replace, or restore as needed to ensure proper operation.
b	Inspect pumps and associated electrical components.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed to ensure proper operation.

c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
d	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
e	Check pump drive for wear or problems due to poor alignment or poor bearing seating.	Lubricate and adjust, and record evidence of wear.	Annually	Repair or replace as needed to ensure proper operation.
f	Check for proper fluid flow. Clean, adjust, and repair as needed to restore proper flow.	Clean, adjust, as needed to restore proper flow.	Annually	Repair, replace, or restore as needed to ensure proper operation.
g	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
h	Check insulation, vibration isolators, and flexible connectors for integrity.	Clean as needed. Record location of damage.	Annually	Repair, replace, or restore as needed to ensure proper operation.

Table 7-22: Rooftop Units

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Monthly	Evaluate frequency of change requirement.
b	Check ultraviolet lamp.	Clean and verify that it is functioning.	Annually	Replace as needed to ensure proper operation.
c	Check P-trap.	Prime as needed to ensure proper operation.	Quarterly	Replace damaged P-trap.
d	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.
e	Check steam system traps, pumps, and controls.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
f	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed to ensure proper operation.
g	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed to ensure proper operation.
h	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check for fin damage and evidence of fouling on the indoor refrigeration-cycle heat- exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
j	Check for fin damage and evidence of fouling on the outdoor	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.

	refrigeration-cycle heat- exchanger surfaces			
k	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
l	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
m	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
n	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
o	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
p	Check fan drive for wear or problems due to poor alignment or poor bearing seating.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
q	Check integrity of all panels and curbs on	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
r	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
s	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*. Find and record the location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.
t	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
u	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
v	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.
w	Check low ambient head pressure control sequence for proper operation.	Clean and adjust components or modify software/algorithm to ensure proper operation.	Annually	Repair or replace as needed to ensure proper operation.
x	Check combustion chamber, burner, and flue for deterioration, leaks, moisture problems, condensation, and combustion products.	Clean, and adjust combustion process for proper operation. Find and record the location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.
y	Check for damage or evidence of leaks on the gas heat section heat-exchanger surfaces.	Clean as needed. Find and record the location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.

z	Inspect insulation and areas of moisture accumulation for biological growth.	Clean as needed.	Annually	Disinfect, repair, or replace as needed to ensure proper operation.
aa	Check compressor oil levels and/or pressure on refrigerant systems having oil level and/or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
bb	Inspect exposed ductwork and external piping for insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table 7-23: Steam Distribution Systems

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system condensate and feed water.	Verify water treatment target levels are being maintained.	Quarterly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
b	Check piping for leaks.	Record location of identified leaks.	Annually	Repair or replace as needed to ensure proper operation.
c	Check safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed to ensure proper operation.
d	Check piping anchors for integrity, and check piping for alignment and expansion fittings for proper operation.	Adjust and lubricate as needed.	Annually	Repair or replace as needed to ensure proper operation.
e	Inspect blowdown or drain valve.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed to ensure proper operation.
f	Check chemical injector device.	Verify water treatment target levels are being maintained.	Quarterly	Repair *equipment*, and treat as needed to ensure proper water chemistry.
g	Check steam system traps, pumps, and controls.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.
h	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
i	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
j	Check strainers.	Clean housing and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed to ensure proper operation.
k	Inspect external piping insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.
l	Check interior of condensate return piping for wall thickness integrity.	Record location of damage.	Annually	Repair, replace, or restore as needed to ensure proper operation.

Table 7-24: Terminal and Control Boxes (e.g., VAV, Fan-Powered, Bypass)
(Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
c	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Semiannually	Repair or replace as needed to ensure proper operation.
d	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Semiannually	Repair and adjust to achieve optimal operating flows.
e	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
f	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
g	Check integrity of all panels on *equipment*.	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
h	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
i	Inspect areas of moisture accumulation for biological growth.	If present, clean	Annually	Disinfect as needed.
j	Inspect exposed ductwork and external piping for insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table 7-25: Water-Source Heat Pumps
(Considering these as "Delivery", since they have direct service to spaces. Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed to ensure proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check ultraviolet lamp.	Clean and verify that it is functioning.	Quarterly	Replace as needed to ensure proper operation.
c	Check P-trap.	Prime as needed to ensure proper operation.	Quarterly	Replace damaged P-trap.
d	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.

e	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed to ensure proper operation.
f	Check for damage or evidence of leaks on the water-cooled heat-exchanger surfaces.	Record location of identified leaks.	Semiannually	Repair, replace, or restore as needed to ensure proper operation.
g	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed to ensure proper operation.
h	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/finish.	Annually	Repair, replace, or restore as needed to ensure proper operation.
i	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
j	Check integrity of all panels on equipment	Replace fasteners as needed to ensure proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
k	Inspect areas of moisture accumulation for biological growth.	If present, clean	Annually	Disinfect as needed.
l	Check fan drive for wear or problems due to poor alignment or poor bearing seating.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed to ensure proper operation.
m	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
n	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed to ensure proper operation.
o	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
p	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat- exchanger surfaces.	Record location of identified leaks.	Annually	Repair, replace, or restore as needed to ensure proper operation.
q	Check for fin damage and evidence of fouling on the indoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed to ensure acceptable *condition*.	Annually	Repair or replace as needed to ensure proper operation.
r	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
s	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed to ensure proper operation.
t	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed to ensure proper operation.

Table 7-26: Air Conveyance systems [Ductworks and diffusers]
(Includes Ductwork, Grilles, Registers and Diffusers, Insulation and Duct Lining)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Ductwork-Supply, return, and exhaust systems: Visual inspection of representative ductwork runs and branch internal surfaces. Visually inspect for accumulated construction related dust or other debris on interior surfaces. If, visual dust accumulation is observed, further evaluate cleanliness following industry guidelines such as ACR The NADCA [National Air Duct Cleaners Association] Standard for Assessment, Cleaning, and Restoration of HVAC Systems.	Clean ductwork system following approved methods. Work should be performed by individual knowledgably in ductwork cleaning guidelines and methods.	Initial installation before occupancy	Verify visual cleanliness at conclusion of cleaning process.
b	Supply and return diffusers: Visually inspect for accumulated construction related dust or other debris on all surfaces. Visual inspection of tops of supply diffuser device for dust and debris. All surfaces should be visually clean.	Clean and disinfect surface areas with approved solutions, if required.	Initial installation before occupancy	Verify visual cleanliness at conclusion of cleaning process.
c	Ductwork-Supply, return, and exhaust systems: Perform visual inspection of representative ductwork runs and branch internal surfaces. Visual inspect for dust or other debris on interior surfaces.	Clean ductwork system following approved methods. Work should be performed by individual knowledgably in ductwork cleaning guidelines and methods.	After occupancy- EVERY 5 YEARS based on visual inspection	Verify visual cleanliness at conclusion of cleaning process.
d	Supply and return diffusers: Visual inspect for accumulated dust or other debris on all surfaces. Visual inspection of tops of supply diffuser device for dust and debris. All surfaces should be visually clean.	Clean and disinfect surface areas with approved solutions, if required.	Patient Care Areas: Semi-annually Non-patient Care Areas: Annually	Verify visual cleanliness at conclusion of cleaning process. Note: coordinate cleaning of diffusers close to smoke detectors to avoid false alarms
e	Exhaust system diffusers and vent surfaces: Surgery, procedure areas, and SPD room exhaust/return vents should be visually inspected for dust accumulation. Bathroom exhaust vents should be visually inspected for dust and debris accumulation.	Clean and disinfect surface areas with approved solutions, if required.	Patient Care Areas: Semi-annually Non-patient Care Areas: Annually	Verify visual cleanliness at conclusion of cleaning process. Note: coordinate cleaning of diffusers close to smoke detectors to avoid false alarms See Section 6 for additional

	~~Common area vents should be visually inspected for dust and debris accumulation.~~			~~information on frequency~~

~~*Cleaning should be performed as necessary based on results from visual inspection.~~

(This appendix is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

INFORMATIVE APPENDIX A - Recommended System *Condition Indicators*

This appendix provides additional information relating to Section 4.3.2.3, "*Condition Indicators*." When designing a *VMP*, it is helpful to identify representative observations or *inspections* of *equipment* conditions to serve as indicators of unacceptable operating conditions, *performance* degradation, or pending failure. This appendix provides examples of such *condition indicators*.

Physical-State Related

a. Deformation, perforation, discoloration, contamination, or oxidation of component surfaces
b. Fluid or vapor leakage evidence
c. Excessive or abnormal noise or vibration
d. Loose or missing fasteners
e. Unusual ice, frost, or condensate formation
f. Worn or damaged electrical insulating materials
g. High levels (>20% area) of surface corrosion or scale accumulation
h. High levels of accumulated dirt or sludge observed as encasing operating mechanisms, covering instrumentation, covering heat transfer surfaces, inhibiting cooling airflow
i. Visible biological growth (fungi, algae, or bacteria)
j. Biological growth determined by test results
k. Failure of insulation or vapor barrier material integrity observed as condensation, physical damage, or creating a hazardous *condition* risking injury on human contact
l. Slow-running or overflowing drains
m. Overheated electrical *equipment*
n. Nonfunctional *equipment* observed as *equipment* energized but where *equipment* is not delivering intended service, such as lack of airflow or water flow
o. Torn or perforated filter media
p. Abnormal building or space pressures
q. Abnormal odors, such as burning smells or natural gas, sensed as smoke, steam, ozone-electrical, or sewer gas (Be wary of potential toxic fumes; test before entering area or confined space.)
r. Visible smoke (Be wary of potential toxic fumes; test before entering area or confined space.)

…

Program or Plan Related

a. Poor field practices: Review inspection documentation and/or technician execution to ~~ensure~~verify *maintenance tasks* are performed correctly.
b. Insufficient time budgeted for *tasks*: Review time budgeted to the technician to ~~ensure~~verify that reasonable time has been given to perform the *tasks*.
c. Component repairs noted/pending/not made: Inspect documentation to determine that repair or component replacement has been undertaken.
d. Obsolete *equipment* or components: Determine whether the *equipment* or component has been in service beyond its useful life.
e. Lack of a space program and/or accurate inventory of spaces to be included in the *VMP*

f. Lack of classification of spaces as critically and non-critically ventilated

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(This appendix is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

INFORMATIVE APPENDIX B - Sources of Program Objectives

This appendix provides additional information relating to Section 4.3.2.4, "*VMP* Objectives." These sources may assist in establishing specific *program objectives* based on *Basis of Design* and operational criteria specific to a particular system:

a. Design documents for the HVAC system, with the provision that those documents still reflect the current loads, space utilization, and other system requirements
b. A duly licensed professional authorized to perform HVAC design work
c. Manufacturers' technical material or generally accepted industry criteria
d. Guidance from ASHRAE Standards 55, 62.1 , 90.1 and ASHRAE/ASHE Standard 170
e. Authority having jurisdiction
f. Licensed HVAC contractor
g. Owner's program requirements
h. Space Program as referenced in ASHRAE 170 (2021), section 5.2

(This appendix is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

INFORMATIVE APPENDIX C - Situations Requiring Review of the Maintenance Plan

This appendix provides additional information relating to Section 4.5, "Revision of the *VMP*." The following list includes examples of changes to the facility, HVAC systems, and *equipment* that require review of the *VMP*:

a. Modifications to the building that impact HVAC capacities or configuration
b. Changes to building function or building use that impact HVAC design intent or configuration
c. Changes to HVAC components or HVAC system
d. One or more systems found incapable of achieving their design intent or owner requirements
e. Documented, agreed-upon recommendations from the responsible party or maintenance provider
f. Miscellaneous changes:
    1. Changes to *equipment condition*
    2. Changes to *equipment* status
    3. Changes to the facility
    4. Changes to the space function
    5. Acquisition of new maintenance technology
    6. Revisions to task frequencies in response to actual conditions ~~shall~~ should result in improved *condition* or reduced inspection and maintenance work.

(This appendix is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

INFORMATIVE APPENDIX F – Ventilation Management Program Plan

Informative Appendix F provides nine steps to developing a *ventilation management program plan* (*VMP*). A *VMP* will help health care organizations manage ventilation and other HVAC systems to manage patient clinical needs and provide occupant comfort while maintaining compliance with applicable accreditation, licensure and regulatory standards. A *VMP* is established and supported by a multidisciplinary committee and aims to identify, develop and implement effective strategies to manage and maintain ventilation and other HVAC systems with a focus on providing environmental control for the safety and comfort of health care facility occupants. The following nine-step process provides a framework for developing a *VMP* for health care facilities. The recommended nine steps to develop a *VMP* are:

1. Form a committee or team. Engineering; planning, design and construction; accreditation; infection prevention; nursing; pharmacy; and perioperative services should be represented on the committee.
2. Educate the Committee. Facilities professionals should dedicate one of the early committee meetings to educate the clinical leaders on ventilation-related definitions, such as the basic elements of room pressurization, the relationship between temperature and humidity, and the purpose of air changes.
3. Establish a functional space listing. The committee will need to develop a comprehensive list of all the space functions in the facility with ventilation requirements. Facility spaces constantly change to adapt to the needs of the organization. Any change requests should be reviewed by the committee to ~~ensure~~verify that the existing ventilation in the space can support the requested change. Having a single list of these functional spaces will help to better manage changes as they happen.
4. Risk Ranking. To prioritize testing and excursion response times, the space element criteria, including pressure, temperature and humidity, should be risk-ranked for each space. Ranking spaces based on Section 5 as critically or non-critically ventilated will provide guidance for the establishment of the *condition indicators* within the *VMP*. The following is an example of a Risk Ranking table:

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(This appendix is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

INFORMATIVE APPENDIX G – Ventilation Management Program Plan Baseline Inspection and Maintenance Tasks

Informative Appendix G provides a series of tables that list the baseline inspection and maintenance tasks that a facility might want to consider. Organizations should modify the frequency of inspection task, if warranted by analysis, and identification of acceptable or unacceptable conditions as listed in Sections 6.9 and 6.10. The continued application of building management systems and computer maintenance management systems provides for advanced monitoring and verification of *condition indicators* throughout a facility. While the baseline recommendations listed in the tables within this informative appendix are indicative of a more manual process the use of *BMS* and other automated methods is encouraged and can provide a more reliable and proactive response to excursions from established *condition indicators*. The *VMP* should document monitoring and verification process for monitored spaces.

Table G-1: Air Distribution Systems

(Includes Ductwork, Grilles, Registers and Diffusers, Insulation and Duct Lining)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check control system and devices for evidence of improper operation.	Clean, lubricate, repair, adjust.	Annually	Replace or recalibrate components for proper operation.
b	Ductwork-Supply, return, and exhaust systems: Visual inspection of representative ductwork runs and branch internal surfaces. Visually inspect for accumulated dust or other debris on interior surfaces.	Clean ductwork system following approved methods.	After occupancy - EVERY 5 YEARS based on visual inspection	Verify visual cleanliness at conclusion of cleaning process.
c	Inspect grilles, registers, and diffusers for dirt accumulation.	Remove any blockage or obstructions. Clean as needed to remove dirt build up.	Annually	Replace if missing or damaged.
d	Check damper for *condition*, setting, and operation.	Clean, lubricate, repair, replace, or adjust as needed for proper operation.	Annually	Replace if missing or damaged.
e	Inspect exposed duct work for leaks that would impact the ability of the HVAC system to deliver the quantity of air prescribed in the VMP.	Compare AHU supply flow rates versus measured room supply air flow rates.	Annually	Repair and leak test the affected areas of duct work.
f	Inspect areas of moisture accumulation for biological growth.	If present, clean.	Annually	Disinfect as needed.
g	Inspect exposed ductwork for insulation and vapor barrier integrity.	Record damage locations.	Annually	Replace or repair if needed.
h	Inspect internally lined ductwork until the first turn or up to 20 ft (6.1 m) from a potential moisture source, such as a supply plenum, from air handler, outdoor air damper, humidifier, etc. for water damage and/or biological contamination.	Determine and record source of moisture.	Annually	Eliminate moisture source. Repair/replace wet insulation. Remove biological contamination and disinfect surfaces. Consider

				replacement of internally lined ductwork

*Cleaning should be performed as necessary based on results from visual inspection.

Table G-2: Air Handlers
(Includes coils in the air handlers)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a1	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation based on pressure drop	Dependent on pressure drop	Evaluate frequency of change requirement.
a2	Check for particulate accumulation on filters.	If not based on pressure drop	Based on historical data	
b	If installed check ultraviolet lamp.	Clean and verify that it is functioning.	Semiannually	Replace according to MIFU or as needed for proper operation.
c	Check P-trap.	Prime as needed for proper operation.	Quarterly	Replace damaged P-trap.
d	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Semiannually	Disinfect as needed.
e	Check steam system traps, condensate pumps, strainers, and controls.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
f	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair, recalibrate or replace components as needed for proper operation.
g	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
h	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually or detected with fault issues or user complaints	Repair, replace, or restore as needed for proper operation.
i	Check for damage or evidence of leaks on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Record location of identified leaks.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed for proper operation.
k	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
l	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.

m	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
n	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
o	Check integrity of all panels on equipment.	Replace fasteners as needed for proper integrity and fit/finish of equipment.	Annually	Repair or replace damaged panels.
p	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
q	Check for fin damage and evidence of fouling on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed for acceptable condition.	Annually	Repair or replace as needed for proper operation.
r	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
s	Check damper for condition, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
t	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
u	Inspect exposed ductwork for insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.
v	Check outdoor air intake birdscreen for integrity	Record location of any damage and lean as needed	Annually	Repair or replace as needed

Table G-3: Boilers
(including condensing, boiler stack, superheaters and heat recovery boilers)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	For systems using fuel oil, inspect fuel filter.	Clean, and verify proper operation.	Monthly	Repair or replace as needed for proper operation.
b	Perform chemical testing of system water.	Verify water treatment target levels are being maintained.	Weekly or per VMP	Repair *equipment*, and treat as needed for proper water chemistry.
c	For systems using fuel oil, check fuel pump for proper operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed for proper operation.
d	Inspect blowdown or drain valve. Clear all debris for proper operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed for proper operation.
e	Check for evidence of leakage of fuel supply, heat transfer fluid, and flue gas.	Record location of identified leaks.	Quarterly	Repair or replace as needed for proper operation.
f	For systems using natural gas, check gas pressure, gas valve operation, and combustion fan operation.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed for proper operation.

g	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
h	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair or replace as needed for proper operation.
i	Check for evidence of buildup or fouling, corrosion, or degradation on heat-exchange surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
k	Check combustion chamber, burner, and flue for deterioration, moisture problems, condensation, and combustion products.	Clean, and adjust combustion process for proper operation.	Annually	Repair or replace as needed for proper operation.
l	Inspect refractory for damage or wear.	Clean combustion-side e.g., fire tubes, upper and lower drums. Record location of refractory damage or wear.	Annually	Repair or replace as needed for proper operation.
m	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed for proper operation.

Table G-4: Chillers - Absorption

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for the presence of noncondensable. Note and log purge count.	Adjust vacuum-pump purge time as needed for noncondensable removal level.	Weekly	Repair or replace as needed for proper operation.
b	Perform chemical testing of system water.	Treat as needed for proper water chemistry and freeze protection target levels are being maintained.	Monthly	Repair *equipment*, and treat as needed for proper water chemistry.
c	Check steam system traps, condensate pumps, strainers and controls.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
d	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
e	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Semiannually	Repair, replace, or restore as needed for proper operation.
f	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
g	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
h	Check for fouling, corrosion, or degradation.	Clean as needed.	Annually	Repair, replace, or restore as needed for proper operation.

i	Check open drive couplings, bearings, and seals for evidence wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
k	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
l	Check inhibitor and internal fluid chemistry.	Correct inhibitor and internal fluid chemistry if outside of established operating ranges.	Annually	Repair or replace as needed for proper operation.
m	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed for proper operation.

Table G-5: Chillers—Air-Cooled

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed for proper water chemistry and freeze protection target levels are being maintained.	Quarterly	Repair *equipment*, and treat as needed for proper water chemistry.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
c	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed for proper operation.
d	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
e	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
f	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
g	Check refrigerant system pressures and/or temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
h	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
i	Check for fin damage and evidence of fouling on the outdoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
j	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the	Annually	Repair and adjust to achieve optimal operating flows.

		location of identified leaks.		
k	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat- exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration- cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat- exchanger surfaces.
l	Check low ambient head pressure control sequence for evidence of improper operation.	Clean and adjust components or modify software/algorithm for proper operation.	Annually	Repair or replace as needed for proper operation.
m	Check compressor oil level and/or pressure on refrigerant systems having oil level and/ or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.

Table G-6: Chillers—Water-Cooled
(Include provision for water-side economizers)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
A	Perform chemical testing of system water.	Treat as needed for proper water chemistry and freeze protection target levels are being maintained.	Monthly	Repair *equipment*, and treat as needed for proper water chemistry.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
c	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace screen or air filter.	Annually	Repair, replace, or restore as needed for proper operation.
d	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
e	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
f	Check refrigerant system pressures and/or temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
g	Check open drive couplings, bearings, and seals for evidence wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed for proper operation.
h	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
i	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
j	Check compressor oil level and/or pressure on refrigerant systems	When outside of recommended levels,	Annually	Repair, and adjust refrigerant to

	having oil level and/ or pressure measurement means.	find and record the cause.		achieve optimal operating levels.
k	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.

Table G-7: Coils and Radiators
(Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check ultraviolet lamp.	Clean and verify that it is functioning.	Semiannually	Replace as needed for proper operation.
b	Check for proper operation of control valves and vents.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
c	Check P-trap.	Prime as needed for proper operation.	Quarterly	Replace damaged P-trap.
d	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed for proper operation.
e	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
f	Check refrigerant system temperatures.	When outside of recommended levels, find and record location of identified leaks.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
g	Check for damage or evidence of leaks on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*. Record location of identified leaks.	Annually	Repair or replace as needed for proper operation.
h	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
j	Check for fin damage and evidence of fouling on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
k	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
l	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.

Table G-8: Condensing Units
(Split System exterior component. Indoor/Evaporator section in “Delivery”)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
b	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
c	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing & tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed for proper operation.
d	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
e	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
f	Check refrigerant system temperatures.	When outside of recommended levels, find and record location of identified leaks.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
g	Check refrigerant system pressures or temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
h	Check for fin damage and evidence of fouling on the outdoor refrigeration-cycle heat- exchanger surfaces.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Check open drive couplings, bearings, and seals for evidence of wear or alignment problems.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.
k	Check low ambient head pressure control sequence for proper operation.	Clean and adjust components or modify software/algorithm for proper operation.	Seasonally	Repair or replace as needed for proper operation.
l	Check compressor oil level and/or pressure on refrigerant systems having oil level and/or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Annually

Table G-9: Control Systems

(includes sensors and actuators not in spaces. Does not include controls integral to equipment)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*

a	For pneumatic systems, check compressed-air system (e.g., compressor, dryer, receiver, blowdown valve) for proper operation. Check for evidence of oil carryover and *condition* of oil filter.	Clean and lubricate as needed.	Monthly	Repair or replace as needed for proper operation.
b	For pneumatic systems, check for proper air pressure.	Clean, lubricate, adjust.	Monthly	Repair or replace as needed for proper operation.
c	For systems designed specifically for humidity control, measure relative humidity.	Clean, lubricate, adjust.	Quarterly	Repair or replace as needed for proper operation.
d	Check alarms and alarm history.	Note and respond as required.	Quarterly	Repair or replace as needed for proper operation.
e	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
f	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair, recalibrate or replace components as needed for proper operation.
g	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
h	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
i	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
j	For pneumatic systems, check pneumatic lines for blockages.	Clean as needed.	Annually	Repair, replace, or restore as needed for proper operation.
k	Check to see that backup of digital control program is current.	Update when it is not current.	Annually	Repair, replace, or restore as needed for proper operation.
l	Check battery backup and verify proper operation.	Clean and maintain batteries as needed.	Annually	Repair, replace, or restore as needed for proper operation.
m	Verify actuator movement and device response to control output.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed for proper operation.
n	Change *building management system* (BMS) interface user authentication passwords.	Make the change.	Annually	Repair, replace, or restore as needed for proper operation.
o	Verify no *equipment* has been left in override (hand/OFF instead of auto) either locally or through the BMS	Make corrections as required.	Weekly	Repair, replace, or restore as needed for proper operation.
p	Simulate an alarm *condition* in the system, which normally notifies personnel via email or text message, to confirm proper operation	Restore as required.	Annually	Repair, replace, or restore as needed for proper operation.

Table G-10: Cooling Towers and Evaporative-Cooled Devices

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed for proper water chemistry and freeze protection target levels are being maintained.	Monthly or based on Water Management Plan	Repair *equipment*, and treat as needed for proper water chemistry.
b	Check conductivity and other sensors for proper readings.	Clean, and verify proper operation.	Monthly	Repair or replace as needed for proper operation.
c	Inspect blowdown or drain valve.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed for proper operation.
d	Check cooling-tower-fan open drive system couplings, bearings, and seals for wear and proper alignment.	Lubricate and align as needed.	Quarterly	Repair, replace, or restore as needed for proper operation.
e	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Quarterly	Replace belts and sheaves as needed for proper operation.
f	Check for fouling, corrosion, degradation, or dirt/debris accumulation on or in sump and strainer, wet decks, fill, nozzles, and exterior louvers.	Clean and restore as needed for acceptable *condition*.	Seasonally	Repair or replace as needed for proper operation.
g	If two-stage (dual flow rate) tower, verify proper operation at both high and low flow rates.	Clean, and verify proper operation.	Seasonally	Repair or replace as needed for proper operation.
h	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Seasonally	Repair or replace components as needed for proper operation.
i	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed for proper operation.
j	Inspect pumps and associated electrical components.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
k	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
l	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
m	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
n	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.

Table G-11: Dehumidification and Humidification Devices

(Utility", as it may exist inside a unit. However, some are closer to the delivery point, so considering "Distribution" here.)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check ultraviolet lamp.	Clean and verify that it is functioning.	Quarterly	Replace as needed for proper operation.
b	For systems designed specifically for humidity control, measure relative humidity.	Clean, lubricate, and verify proper operation.	Quarterly	Repair or replace as needed for proper operation.
c	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
d	Check steam system traps, condensate pumps, and controls.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
e	Check for fouling, corrosion, or degradation.	Clean and restore as needed for acceptable *condition*.	Annually o per VMP	Repair, replace, or restore as needed for proper operation.
f	Check strainers.	Correct as needed. Clean housing, and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed for proper operation.
g	Inspect distributors, drain pans, and other areas of moisture accumulation for biological growth.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.

Table G-12: Economizers—Air Side

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Monthly	Evaluate frequency of change requirement.
b	For communicating economizers only, check, review, and document alarms.	Reset resolved alarms	Quarterly	Repair, adjust, or replace components for proper operation.
c	For communicating economizers only, check *condition*, setting, and operation of all related sensors.	Clean, lubricate, adjust.	Semiannually	Repair, adjust, or replace components for proper operation.
d	Check *condition*, setting, and operation of the economizer controller and actuators.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
e	Check dampers for *condition*, setting, and operation.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
f	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed for proper operation.
g	For all economizers, check *condition*, setting, and operation of all related sensors against a trusted sensor.	Clean, lubricate, adjust.	Annually	Repair, adjust, or replace components for proper operation.
h	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Inspect areas of moisture accumulation for biological growth.	If present, clean.	Annually	Disinfect as needed.

j	Check *condition*, setting, and operation of the low-limit stat.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
k	Check *condition*, setting, and operation of the relief dampers or power exhaust fan.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.

Table G-13: Fan (e.g., Exhaust, Supply, Transfer, Return)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
b	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed for proper operation.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
d	Check fan drive for problems due to poor alignment or poor bearing seating.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
e	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
f	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
g	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
h	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
i	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/finish of *equipment*.	Annually	Repair or replace damaged panels.
j	Inspect exposed ductwork and external piping for insulation and vapor barrier integrity.	Record location of damage.	Annually	Repair or replace as needed.
k	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
l	Inspect flexible connections.	Clean as needed.	Annually	Repair, replace, or restore as needed for proper operation.

Table G-14: Fan Coils—Hot-Water, and Steam Unit Heaters
(Limited to storage and warehousing, mostly associated with integrity verification)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check ultraviolet lamp.	Clean and verify that it is functioning.	Quarterly	Replace as needed for proper operation.

c	Check P-trap.	Prime as needed for proper operation.	Quarterly	Replace damaged P-trap.
d	Check steam system traps, pumps, and controls.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
e	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
f	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
g	Check for damage or evidence of leaks on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*. Find and record the location of identified leaks.	Semiannually	Repair or replace as needed for proper operation.
h	Check air-filter fit and housing seal integrity.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
i	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
k	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
l	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
m	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
n	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
o	Check for proper fluid flow.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair, and adjust to achieve optimal operating flows.
p	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
q	Check for fin damage and evidence of fouling on the refrigeration-cycle indoor heat exchanger, chilled-water-coil heat exchanger, or steam or hot-water-coil heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
r	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed for proper operation.

s	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
t	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.

Table G-15: Furnaces—Combustion Unit Heaters
(Limited to storage and warehousing, mostly associated with integrity verification)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on air filters.	Clean or replace as needed for proper operation.	Monthly	Evaluate frequency of change requirement.
b	For systems using fuel oil, inspect fuel filter.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
c	For systems using fuel oil, check fuel pump for proper operation.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
d	Check control system and devices for evidence of improper operation.	Clean, lubricate, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
f	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed for proper operation.
g	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
h	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
j	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
k	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
l	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
m	Check combustion chamber, burner, and flue for deterioration, leaks, moisture problems, condensation, and combustion products.	Clean, and adjust combustion process for proper operation. Find and record the location of identified leaks.	Annually	Repair or replace as needed for proper operation.
n	Verify proper operation of safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed for proper operation.
o	Check for damage or evidence of leaks on the gas heat section heat-exchanger surfaces.	Clean as needed. Find and record the location of identified leaks.	Annually	Repair or replace as needed for proper operation.

Table G-16: HVAC Water Distribution Systems

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system water.	Treat as needed for proper water chemistry and freeze protection target levels are being maintained.	Monthly	Repair *equipment*, and treat as needed for proper water chemistry.

b	Check chemical injector device.	Verify water treatment target levels are being maintained.	Annually	Repair *equipment*, and treat as needed for proper water chemistry.
c	Check make-up water system for pressure and operation.	Clean and adjust as needed.	Semiannually	Repair, replace, or restore as needed for proper operation.
d	Vent air from system high points. Check for proper fluid flow, and check piping for leaks.	When leaking, or when outside of recommended flow range, find and record the location of identified leaks.	Quarterly	Repair, replace, or restore as needed for proper operation.
e	Inspect pumps and associated electrical components.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
f	Check for evidence of fouling on the water- cooled heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair, replace, or restore as needed for proper operation.
g	Check strainers.	Correct as needed. Clean housing, and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed for proper operation.
h	Inspect external piping insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.
i	Check freeze stats, relief valves, flow and float switches, low-water cutoffs, and other safety devices for proper operation	Clean, lubricate, adjust. Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check for visible leaks at gaskets & plate assemblies	inspect gaskets and plates for defects/debris	Semiannually	valve off piping to plate and frame heat exchangers, clean or replace gaskets
k	Check for visible leaks at shell and coil side of heat exchanger	inspect piping assemblies for coils and gasket *condition* at shell	Semiannually	Replace gaskets as needed, repair or replace entering/leaving pipe assemblies

Table G-17: Indoor Section Duct-Free Splits

(Condenser (outdoor unit) is in "Utility". Includes Indoor Section Duct-Free Splits. Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed for proper operation.
c	Check P-trap drain.	Prime as needed for proper operation.	Semiannually	Replace damaged P-trap.
d	Check air-filter fit and housing seal integrity.	Clean as needed.	Annually	Repair or replace as needed for proper operation.

e	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat- exchanger surfaces.	Clean and restore as needed for acceptable *condition*. Record location of identified leaks.	Annually	Repair or replace as needed for proper operation.
f	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
g	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
h	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
i	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
j	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.

Table G-18: Outdoor-Air Heat-Exchanging Systems
(includes Enthalpy wheels and ERVs, as well as "Outdoor-Air Heat-Exchanging Systems")

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Monthly	Evaluate frequency of change requirement.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
c	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Semiannually	Disinfect as needed.
d	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
e	Check for proper operation of heat exchanger.	Clean, and adjust for proper operation.	Semiannually	Repair or replace components as needed for proper operation.
f	Check for proper operation of enthalpy device.	Clean, and adjust for proper operation.	Semiannually	Repair or replace as needed for proper operation.
g	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Semiannually	Repair or replace as needed for proper operation.
h	Check *condition*, setting, and operation of damper motors.	Adjust and lubricate as necessary.	Semiannually	Repair or replace as needed for proper operation.
i	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/finish.	Annually	Repair, replace, or restore as needed for proper operation.
j	Check control box for dirt, debris, and/or loose terminations.	Clean, lubricate, and verify proper operation.	Annually	Repair or replace as needed for proper operation.

k	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
l	Assess field-serviceable bearings.	Lubricate and align as needed.	Annually	Repair, replace, or restore as needed for proper operation.
m	Inspect exposed ductwork for insulation and vapor barrier integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table G-19: Package Terminal Air Conditioners/Heat Pumps (PTACs/PTHPs)
(Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check condensate slinger and/or drain system.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed for proper operation.
d	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
e	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed for proper operation.
f	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
g	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
h	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
i	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
j	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
k	Check for fin damage and evidence of fouling on the indoor refrigeration-cycle heat- exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
l	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.

m	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
n	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.
o	Check for evidence of fouling on the outdoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
p	Inspect areas of moisture accumulation for biological growth.	Clean, and verify proper operation.	Annually	Disinfect as needed.
q	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.

Table G-20: Pumps

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Semiannually	Repair, replace, or restore as needed for proper operation.
b	Inspect pumps and associated electrical components.	Clean, and verify proper operation.	Semiannually	Repair or replace as needed for proper operation.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
d	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
e	Check pump drive for wear or problems due to poor alignment or poor bearing seating.	Lubricate and adjust, and record evidence of wear.	Annually	Repair or replace as needed for proper operation.
f	Check for proper fluid flow. Clean, adjust, and repair as needed to restore proper flow.	Clean, adjust, as needed to restore proper flow.	Annually	Repair, replace, or restore as needed for proper operation.
g	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
h	Check insulation, vibration isolators, and flexible connectors for integrity.	Clean as needed. Record location of damage.	Annually	Repair, replace, or restore as needed for proper operation.

Table G-21: Rooftop Units

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Monthly	Evaluate frequency of change requirement.
b	Check ultraviolet lamp.	Clean and verify that it is functioning.	Annually	Replace as needed for proper operation.
c	Check P-trap.	Prime as needed for proper operation.	Quarterly	Replace damaged P-trap.
d	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.

e	Check steam system traps, pumps, and controls.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
f	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Annually	Repair or replace components as needed for proper operation.
g	Check fan-belt tension, check for belt wear, and check sheaves for evidence of improper alignment or evidence of wear.	Correct tension and sheave alignment.	Semiannually	Replace belts and sheaves as needed for proper operation.
h	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed for proper operation.
i	Check for fin damage and evidence of fouling on the indoor refrigeration-cycle heat- exchanger surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
j	Check for fin damage and evidence of fouling on the outdoor refrigeration-cycle heat- exchanger surfaces	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.
k	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed for proper operation.
l	Check control box for dirt, debris, and/or loose terminations.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
m	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
n	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
o	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
p	Check fan drive for wear or problems due to poor alignment or poor bearing seating.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
q	Check integrity of all panels and curbs on	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
r	Assess field-serviceable bearings.	Lubricate as necessary.	Annually	Replace as needed.
s	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat-exchanger surfaces.	Clean and restore as needed for acceptable *condition*. Find and record the location of identified leaks.	Annually	Repair or replace as needed for proper operation.
t	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
u	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.

v	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.	Annually	Check for damage or evidence of leaks on the outdoor refrigeration-cycle heat-exchanger surfaces.
w	Check low ambient head pressure control sequence for proper operation.	Clean and adjust components or modify software/algorithm for proper operation.	Seasonally	Repair or replace as needed for proper operation.
x	Check combustion chamber, burner, and flue for deterioration, leaks, moisture problems, condensation, and combustion products.	Clean, and adjust combustion process for proper operation. Find and record the location of identified leaks.	Annually	Repair or replace as needed for proper operation.
y	Check for damage or evidence of leaks on the gas heat section heat-exchanger surfaces.	Clean as needed. Find and record the location of identified leaks.	Annually	Repair or replace as needed for proper operation.
z	Inspect insulation and areas of moisture accumulation for biological growth.	Clean as needed.	Annually	Disinfect, repair, or replace as needed for proper operation.
aa	Check compressor oil levels and/or pressure on refrigerant systems having oil level and/or pressure measurement means.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
bb	Inspect exposed ductwork and external piping for insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table G-22: Steam Distribution Systems

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Perform chemical testing of system condensate and feed water.	Verify water treatment target levels are being maintained.	Monthly or per VMP	Repair *equipment*, and treat as needed for proper water chemistry.
b	Check piping for leaks.	Record location of identified leaks.	Annually	Repair or replace as needed for proper operation.
c	Check safety devices per manufacturer's recommendations.	Clean, lubricate, adjust.	Annually	Repair or replace as needed for proper operation.
d	Check piping anchors for integrity, and check piping for alignment and expansion fittings for proper operation.	Adjust and lubricate as needed.	Annually	Repair or replace as needed for proper operation.
e	Inspect blowdown or drain valve.	Clean, and verify proper operation.	Quarterly	Repair or replace as needed for proper operation.
f	Check chemical injector device.	Verify water treatment target levels are being maintained.	Quarterly	Repair *equipment*, and treat as needed for proper water chemistry.
g	Check steam system traps, pumps, and controls.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.
h	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed for acceptable *condition*.	Annually	Repair or replace as needed for proper operation.

i	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
j	Check strainers.	Clean housing and tighten connections as needed. Clean strainers.	Annually	Repair, replace, or restore as needed for proper operation.
k	Inspect external piping insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table G-23: Terminal and Control Boxes (e.g., VAV, Fan-Powered, Bypass)
(Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*
a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
c	Check for evidence of build-up, fouling, corrosion, or degradation on heat exchange surfaces.	Clean and restore as needed for acceptable *condition*.	Semiannually	Repair or replace as needed for proper operation.
d	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Semiannually	Repair and adjust to achieve optimal operating flows.
e	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/ finish.	Annually	Repair, replace, or restore as needed for proper operation.
f	Check fan blades and fan housing.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
g	Check integrity of all panels on *equipment*.	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
h	Check damper for *condition*, setting, and operation.	Adjust and lubricate as necessary.	Annually	Repair or replace as needed for proper operation.
i	Inspect areas of moisture accumulation for biological growth.	If present, clean	Annually	Disinfect as needed.
j	Inspect exposed ductwork and external piping for insulation and vapor barrier for integrity.	Record location of damage.	Annually	Repair or replace as needed.

Table G-24: Water-Source Heat Pumps
(Considering these as “Delivery”, since they have direct service to spaces. Includes Thermostats and local sensors)

Task ID	Inspection Task	Maintenance Task	Frequency*	*Corrective Action*

a	Check for particulate accumulation on filters.	Clean or replace as needed for proper operation.	Quarterly	Evaluate frequency of change requirement.
b	Check drain pan, drain line, coil, and other areas of moisture accumulation for visible signs of biological growth.	Clean, and verify proper operation.	Quarterly	Disinfect as needed.
c	Check control system and devices for evidence of improper operation.	Clean, lubricate, adjust.	Semiannually	Repair or replace components as needed for proper operation.
d	Check for damage or evidence of leaks on the water-cooled heat-exchanger surfaces.	Record location of identified leaks.	Semiannually	Repair, replace, or restore as needed for proper operation.
e	Check variable-frequency drive for proper operation.	Correct as needed. Clean housing, and tighten connections as needed. Clean or replace air filter.	Annually	Repair, replace, or restore as needed for proper operation.
f	Check air-filter fit and housing seal integrity.	Clean and verify proper fit/finish.	Annually	Repair, replace, or restore as needed for proper operation.
g	Check fan blades, fan housing and an drive for wear or problems due to poor alignment or poor bearing seating..	Clean, adjust and lubricate as needed.	Annually	Repair or replace as needed for proper operation.
h	Check integrity of all panels on equipment	Replace fasteners as needed for proper integrity and fit/ finish of *equipment*.	Annually	Repair or replace damaged panels.
i	Inspect areas of moisture accumulation for biological growth.	If present, clean	Annually	Disinfect as needed.
j	Check f	as necessary.	Annually	Repair or replace as needed for proper operation.
k	Check motor contactor for pitting or other signs of damage.	Clean and tighten electrical connections as needed.	Annually	Repair, replace, or restore as needed for proper operation.
l	Check refrigerant system temperatures.	When outside of recommended levels, find and record the cause.	Annually	Repair, and adjust refrigerant to achieve optimal operating levels.
m	Check for damage or evidence of leaks on the indoor refrigeration-cycle heat- exchanger surfaces and Check for fin damage and evidence of fouling.	Record location of identified leaks. Clean and restore as needed for acceptable *condition*.	Annually	Repair, replace, or restore as needed for proper operation.
n	Check for proper fluid flow and for fluid leaks.	Adjust flow when outside of recommended flow range. When leaking, find and record the location of identified leaks.	Annually	Repair and adjust to achieve optimal operating flows.
o	Inspect for evidence of moisture carryover beyond the drain pan from cooling coils.	Clean as needed.	Annually	Repair or replace as needed for proper operation.
p	Check condensate pump.	Clean, and verify proper operation.	Annually	Repair or replace as needed for proper operation.