

O&M Best Practice Checklist

THERMAL COMFORT

A Preventive Maintenance Checklist for Owners and Facility Operators

AUDIENCE

Facility maintenance staff, building operators, controls and mechanical (HVAC) technicians, and chief building engineers responsible for the operation, inspection, verification, and maintenance of building systems including enclosures, interior systems, environmental controls. Clients, designers, commissioning agents, energy managers, industrial hygienists, and owners may also use this checklist as a reference. Applies to all occupied spaces including residential.

MINDSET

Proactive vs. Reactive. Healthy buildings start with healthy systems and stay ready for reactive scenarios when they arise.

WHY

Thermal discomfort is a source of stress that directly affects productivity, cognitive performance, mood, social interaction, attendance, and long-term satisfaction. In operating buildings, many thermal complaints arise not from a single design element but from how occupants interact thermally with the building's passive systems (architecture, enclosure, interior systems) and active systems (HVAC). Prevention should begin with well-designed passive elements, while the active HVAC system should address any shortcomings in those passive strategies. In practice, however, HVAC systems are often selected to meet code requirements rather than solve specific passive problems nor are they selected to enable compliance with thermal comfort standards. Active systems and their controls may also fail to account for occupants' specific needs. Sensors often do not reflect what people thermally feel at the places where they work, rest, or spend time. In addition, controls and sensors may drift from their setpoints, and air, hydronic, and steam systems may distribute flows and temperature unevenly. Other common issues include poor or mismatched zoning, inadequate controls, tampered or drifting sensors, and poorly designed or failed terminal units. Protocols may also limit clothing or other adaptive measures, and occupant loads may differ from design assumptions. The primary standard for thermal comfort is ANSI/ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy. Recent editions, such as the 2023 version, include an informative appendix (L) with guidance on measuring, surveying, and evaluating comfort in existing spaces. Because thermal comfort depends on the interaction between people, environments, and building systems, any changes to the architecture, enclosure, interior, or HVAC system should be made by qualified professionals. Adaptive measures such as opening windows, closing blinds, adjusting clothing, and using personal fans or heaters can also help when more technical solutions are not possible. However, personal fans and heaters add electrical load to building services and should be used only with permission from a certified building services technician and in accordance with the manufacturers instructions.

BACKGROUND & OBJECTIVES

The goals of this thermal comfort preventive-maintenance checklist are to:

- Bring awareness to owners and operators, that thermal comfort is a subjective experience, it is a personal perception as such it is very difficult to achieve 100% agreement as to what is perceived as an environment that promotes thermal comfort or one that leads to discomfort complaints. As much as it would be convenient to rely on a single metric like air temperature as displayed on a thermostat, the sensation and perception of thermal comfort is based on ranges within a combination of personal factors (clothing and activity), general environmental factors at the location and across the occupants (mean radiant temperature, air temperature, humidity and air speed) and in some cases local factors (floor temperatures, stratification, radiant asymmetry, ankle and general drafts). Since many of these are tied directly to the architecture, enclosure and interior systems, it is important to accept the HVAC systems may solve some of the issues related to the building itself, but not all of them. In addition, the ability or inability to control ones thermal environment via building systems or adaptive measures contributes to ones perception.
- Provide facility staff with a single, practical schedule of monthly, quarterly, semi-annual, annual, and multi-year thermal condition inspection tasks aligned with ANSI/ASHRAE Standard 55-2023 and ANSI/ASHRAE/ACCA Standard 180.
- Maintain space conditions — primarily the air temperature, mean radiant temperature, humidity, and air speed across the occupants. Where occupants are wearing light clothing and doing light duty tasks then radiant asymmetry, floor temperatures, drafts and stratifications should also be managed within the design comfort zone so the original design intent is sustained throughout the life of the building.
- Detect and correct common thermal-discomfort failure modes (overheating, underheating, dryness, mugginess, drafts, cold floors, stratification, inconsistent temperatures) before they become persistent complaints or energy waste.
- Reduce occupant exposure to thermal stress from radiant asymmetry, vertical air temperature difference (stratification), cold or hot floors, and drafts (ankle and general).
- Establish the proactive baseline that supports adaptive comfort strategies, mixed-mode and natural-ventilation operation, and personal-comfort-system policies.
- If applicable, align with voluntary rating systems including LEED v5 (Thermal Comfort), WELL Thermal Comfort, and the ANSI/ASHRAE 55 informative occupant-survey appendix.
- Create a documented, auditable record (logs, dates, findings, corrective actions) that supports tenant comfort agreements, energy management programs, and warranty / insurance requirements.
- Promote a 'good is better than perfect' culture: complete the basic checks every cycle, capture observations, and iterate.

MEASURES OF SUCCESS

- ✓ Occupied-space **operative temperatures** (radiant temperature + air temperature) are within the design comfort range (per the building's chosen ASHRAE 55 method — PMV/PPD, or adaptive — and any tighter LEED/WELL or tenant commitment).
- ✓ Relative humidity (where dehumidification or humidification is provided) tracks design intent without sustained excursions.
- ✓ Air speed at occupant locations is within design limits; no chronic draft complaints at perimeter or under/over diffusers.
- ✓ Temperature stratification (head-to-foot) and draft tolerances within ASHRAE 55 limits at representative zones.

- ✓ Floor surface temperatures within recommended range; no sustained cold-floor complaints at slab-on-grade, cantilevers, or other thermal-bridging locations.
- ✓ Radiant asymmetry temperature differential are within limits ASHRAE Standard 55 limits
- ✓ Building enclosure remains tight — windows operable as designed, weatherstripping intact, infiltration controlled.
- ✓ Personal-comfort policy (clothing, personal fans/heaters where allowed) is published and enforced consistently.
- ✓ Sensor calibration current for all temperature, humidity, and globe / surface / radiant-asymmetry sensors used by the BAS.
- ✓ Annual ASHRAE 55 occupant survey (where program is in place) shows thermal satisfaction according to the standard; recurring complaints have documented corrective action.
- ✓ Reduction in unscheduled work orders related to comfort year over year.

HOW TO USE THIS CHECKLIST

Each frequency tab (Monthly, Quarterly, Semi-Annual, Annual, Multi-Year) is a stand-alone inspection sheet. For each task, record the date completed, the technician initials, and a status (Pass / Fail / N/A / Deferred). If a task fails or cannot be verified, log a corrective action in the 'Findings / Corrective Action' column and on the 'Observations Log' tab. Attach BAS trends, balance reports, sensor calibration certificates, and occupant-survey results to the building's O&M manual. Increase frequency for any task that repeatedly fails, that operates in unusual conditions, or that supports critical-care occupancies. Tasks marked (Vd) require calibrated instruments (thermometer, RH sensor, anemometer/hot-wire, globe thermometer) or a qualified technician (per ASHRAE 55 Appendix L).

PRIMARY SOURCES

- ANSI/ASHRAE Standard 55-2023 — Thermal Environmental Conditions for Human Occupancy (including Informative Appendix L: occupant comfort surveys).
- ANSI/ASHRAE/ACCA Standard 180-2018 — Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems.
- ANSI/ASHRAE Standard 62.1-2025 — Ventilation and Acceptable Indoor Air Quality (humidity and zoning sections relevant to comfort).
- ANSI/ASHRAE/IES Standard 90.1 — Energy Standard for Sites and Buildings (HVAC control and economizer sections).
- ASHRAE Guideline 10 — Interactions Affecting the Achievement of Acceptable Indoor Environments
- ASHRAE Handbook — Fundamentals: Thermal Comfort chapter.
- USGBC LEED v5 — Indoor Environmental Quality credits (Thermal Comfort, Occupant Survey).
- WELL Building Standard — Thermal Comfort concept (verified thermal performance, radiant heating/cooling support, thermal zoning, individual control).
- ISO 7730 / ISO 7726 — international thermal comfort method and instrumentation reference (cross-references for ASHRAE 55).
- Manufacturer O&M instructions and approved control sequences of operation for AHUs, VAV/CAV terminals, fan coils, radiant panels, chilled beams, DOAS, and personal-comfort devices.

Thermal Comfort Preventive Maintenance — Monthly Tasks

Walk-through inspections to be completed every 30 days. These tasks catch the fastest-moving comfort failures: failed setpoints, broken control valves/actuators, VAV/zone equipment, draft and stratification complaints, humidity excursions, and emerging occupant feedback. Most can be completed using the BAS front-end and a handheld thermometer / hygrometer, thermal camera and draft sensor/indicator.

Building / Site:		Inspector:			Period:				
#	Topic / Equipment	Inspection / Maintenance Task	Type	Source / Reference	Standard Section / Clause	Status	Date Completed	Performed By (Initials)	Findings / Corrective Action
SPACE TEMPERATURES & SETPOINTS									
1	Setpoints & schedules	Verify occupied/unoccupied space temperature setpoints in the building control systems (BMS) aka Building Management Systems (BMS), Building Automation Systems (BAS) match the building's published comfort policy (e.g., 70-75°F heating, 73-79°F cooling). Confirm no manual overrides have been set.	V	ASHRAE 55-2023; Facility comfort policy	Operative temperature setpoint and reset schedule.				For all inspection and maintenance tasks, note: there is a high probability the building control systems including sensors are not positioned in areas accurately representing what the occupants may be experiencing. As an example, a thermostat located in a hallway away from the persons) should not be assumed to be a representation of the air temperature at the specific location of a representative occupant. Additionally, air temperature alone is not a proxy for what people thermally experience so it should not be assumed that a thermostat maintaining a setpoint is a proxy for the persons experience. Air temperature is only 1 of 11 metrics considered in compliance with ASHRAE Standard 55. For this reason, assessments should, at a minimum, be done with hand held instruments that can measure air temperatures, surface temperatures, humidity and air velocity at the location of the occupants.
2	BCS trend review temperatures	Review the past 30 days of space-temperature trends in representative zones (perimeter / interior, top / bottom floors, north / south exposure). Flag chronic and sustained deviations > ±2°F from setpoint during occupied hours.	V	ASHRAE 55-2023; ASHRAE 180-2018	Control Strategy				
3	Occupant complaint log	Review and respond to all thermal comfort complaints (too hot, too cold, drafty, stuffy/humid, dry, cold floors, hot/cold spots) received in the past 30 days. Document response and corrective action.	V	ASHRAE 55-2023 Appendix L; LEED v5 EQ	Comfort complaint response				
HUMIDITY & AIR MOTION									
4	Space humidity	Verify relative humidity is within design limits (typically 30-60% RH). Investigate persistent excursions > 60% RH (mold/moisture risk) or < 25% RH (dryness complaints).	V _a	ASHRAE 55-2023; ASHRAE 62.1 §5.12	Humidity limits				
5	Draft check — perimeter & diffusers	Walk perimeter, adjacent to windows and under or over diffusers. Use a hand or a simple smoke source to confirm air speed at the neck/waist level is not creating chronic draft, especially in cool conditions.	V _a	ASHRAE 55-2023 §5.3.4	Local thermal discomfort — draft				
6	Personal comfort devices in use	Note locations where occupants have deployed personal fans, space heaters, or under-desk heaters. Investigate as a comfort signal; verify any in-use device complies with facility electrical and fire policy.	V _a	ASHRAE 55-2023; facility policy	Adaptive comfort. Personal comfort devices				
ZONE-LEVEL EQUIPMENT									
7	Zone valve/radiators VAV / CAV / fan coil — operation	Visually inspect (and via BCS) confirm zone terminal units are operating: valve/radiators VAV / CAV / fan coil — operation. Sample position and valve/actuators response to thermostat call. Check fan coil fans are running on call. Note any units stuck at a position or in fault.	V	ASHRAE 180-2018	Zone terminal equipment				
8	Diffuser / register / radiator / force flows etc. condition	Inspect heat terminal units (HTU) radiators, supply diffusers and return grilles for blockage by furniture, papers, stored items, or damaged fins, dampers/valves. Confirm air and hydronic distribution is reaching occupied zones.	V	ASHRAE 180-2018	Air distribution				
9	Operable windows (mixed-mode buildings)	Where the building uses operable windows or mixed mode ventilation: confirm windows operate freely, weatherstripping is intact and any BMS interlock with mechanical systems is correctly disabling cooling/heating when windows are open.	V	ASHRAE 62.1 §6.4.3; ASHRAE 55	Mixed-mode operation				
OBVIOUS SIGNS OF DISCOMFORT									
10	Stratification observation	In tall, stacked, or atrium spaces, walk floor-to-floor and report any obvious 'cold in the basement / hot upstairs' stratification. Verify mechanical de-stratification (if installed) is running. Check to see if there are any exterior doors or windows propped open that might be causing a chimney effect.	V _a	ASHRAE 55-2023	Vertical air-temperature difference (aka stratification)				
11	Cold floor / cold-window observation	At slab-on-grade entries, cantilevered floors and balconies, or high window-to-wall ratios, note any chronic cold-floor, cold surface or radiant asymmetry complaints. Cross-reference with enclosure inspections.	V _a	ASHRAE 55-2023	Floor temperature / radiant asymmetry/drafts /stratification				
12	Windows blocked or shaded with boxes, hot or furniture	Indicates over heating (and over lighting) due to solar loads. Exterior shading is preferred over interior shading. Install / educate occupants how to engage the use of shading.	V _a	ASHRAE 55-2023	mean radiant temperature radiant asymmetry				
13	Diffusers taped over	Indicates over heating, cooling and drafts. Have the system evaluated for correct temperatures, balanced flows and proper diffuser selections.	V _a	ASHRAE 55-2023	air velocity/drafts				
14	Thermostats behind locked cages	Indicates restricted choices to control space temperatures. Occupants typically are more tolerant of discomfort when they have actively over the environment. If this is not possible, then seek out reasons for why the thermal environment is causing a need to restrict use of the control device. Here adaptive measures (fans, heaters, clothing, options to relocate to a different space) are a good strategy to resolve complaints.	V _a	ASHRAE 55-2023	Control classification, Adaptive comfort				
15	Presence of personal heaters, fans, humidifiers, dehumidifiers	Could be part of the original intent or an indication of over/under heating/cooling, cold floors, drafts, radiant asymmetry (hot or cold), stratifications, unmanaged humidity and mean radiant temperatures.	V _a	ASHRAE 55-2023	operative temperature / humidity, local discomfort				
15	Relocated office furniture	Indicates over/under heating/cooling, drafts, radiant asymmetry	V _a	ASHRAE 55-2023	operative temperature / mean radiant temperature radiant asymmetry / local discomfort				

Type Codes: V = Verify (visual inspection) / BAS data, no calibrated tools | V_a = Validate (calibrated tools, qualified technician)

Thermal Comfort Preventive Maintenance — Quarterly Tasks

Quarterly tasks add a closer look at terminal-unit operation, sensor reasonableness, damper / valve action, seasonal changeover, and economizer performance — the items that most often drift between maintenance cycles.

Building / Site:

Inspector:

Period:

#	Topic / Equipment	Inspection / Maintenance Task	Type	Source / Reference	Standard Section / Clause	Status	Date Completed	Performed By (Initials)	Findings / Corrective Action
TERMINAL EQUIPMENT									
1	VAV / CAV terminal performance	Spot-check airflow at representative terminal units against design CFM (using BAS-displayed flow or balance hood). Confirm reheat sequence functions and minimum airflow setpoints align with comfort and ventilation needs.	V	ASHRAE 180-2018; ASHRAE 62.1 §6.2	Terminal unit performance				
2	Fan coil / blower coil	Inspect fan coil/blower coil filters, condensate drains, and coil cleanliness; verify three-speed or variable-speed fan operation responds to call.	V	ASHRAE 180-2018	Fan coil maintenance				
3	Radiators / Radiant panels / chilled beam / displacement	Where radiators, radiant panels, chilled beams, or displacement ventilation are used, verify surface temperatures, supply-water temperatures, and induced-air patterns match design intent.	V	ASHRAE 180-2018; Manufacturer O&M	Radiant / specialty terminal equipment				
BAS/BCS/BMS SENSORS — REASONABLENESS									
4	Space temperature sensors	Compare BAS-displayed space temperatures in representative zones against a calibrated handheld instrument. Investigate drift greater than ±1°F or the manufacturer-stated tolerance.	Vd	ASHRAE 55-2023 Appendix L; ISO 7726	Sensor accuracy / placement				
5	Humidity sensors	Cross-check space and duct humidity sensors against a calibrated reference. Investigate drift exceeding ±5% RH or manufacturer tolerance.	Vd	ASHRAE 62.1 §5.8; ASHRAE 55-2023	Humidity sensor verification				
6	Globe / radiant-asymmetry sensors (if installed)	Where globe thermometers or radiant-asymmetry sensors are installed in critical spaces, verify reading reasonableness and clean the globe / lens.	V	ISO 7726	Globe / MRT measurement				
DAMPERS, VALVES & DISTRIBUTION									
7	Outside-air dampers	Stroke OA, return-air, exhaust, and economizer dampers full open / full close. Verify smooth travel, full closure, tight actuator clamps, fail-safe direction on power loss.	V	ASHRAE 180-2018; ASHRAE 62.1	Damper assembly				
8	Economizer operation	Where air-side economizers are installed, verify changeover setpoint and integrated economizer operation during the shoulder season. Look for stuck dampers and high-limit lockouts.	V	ASHRAE 90.1 §6	Economizer high-limit / changeover				
9	Hydronic valve operation	Stroke representative chilled-water and hot-water control valves. Verify the BAS commanded position matches the actual stem position, and the valve seats fully closed under no-call conditions. Confirm intended valve rangeability and characteristics have been installed.	V	ASHRAE 180-2018	Control valve performance				
SEASONAL CHANGEOVER									
10	Cooling/heating changeover	At each seasonal transition, verify changeover sequence: chillers / cooling towers idled, boilers/heating plant brought online (or vice versa); reset schedules and economizer changeover updated.	Vd	ASHRAE 90.1 §6; manufacturer O&M	Seasonal changeover sequence				
11	Reset schedules	Audit supply-air temperature reset, hot-water reset, chilled-water reset, and static-pressure reset schedules for accuracy with the new season's load profile.	V	ASHRAE 90.1 §6	Reset schedules				

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Thermal Comfort Preventive Maintenance — Semi-Annual Tasks

Semi-annual tasks (twice per year, typically aligned with cooling-season start-up and heating-season start-up). These checks dig deeper into AHU operation, perimeter and enclosure systems, humidification, and personal-comfort policy audits.

Building / Site:

Inspector:

Period:

#	Topic / Equipment	Inspection / Maintenance Task	Type	Source / Reference	Standard Section / Clause	Status	Date Completed	Performed By (Initials)	Findings / Corrective Action
AHU & PLANT TUNE-UP									
1	AHU start-up / shutdown	Run cooling-season start-up checklist (chiller/heat pump, AHU coils, condensate drains, controls) or heating-season start-up checklist (boiler, heat pump, AHU coils, freeze-stat verification, controls). Document any deficiency.	Vd	ASHRAE 180-2018; manufacturer O&M	Seasonal AHU start-up				
2	Supply-air temperature & reset	Verify supply-air temperature and flows at the AHU during occupied hours tracks reset schedule. Confirm reheat coils / preheat coils are sequenced correctly with cooling coils.	V	ASHRAE 90.1 §6	Supply-air temperature reset				
3	Coil cleanliness — visual	Inspect cooling and heating coils for fouling, fin damage, biological staining, and air-side bypass. Schedule deep coil cleaning if visual loading exceeds OEM threshold.	V	ASHRAE 180-2018	Coil maintenance				
HUMIDIFICATION & DEHUMIDIFICATION									
4	Humidifier full inspection	Inspect humidifiers and dehumidifiers: drain components, water-feed components, biological growth, corrosion, dispersion-tube wetting, and humidity-sensor reasonableness.	V	ASHRAE 62.1 §5.8 / §8.5 Task 7a; ASHRAE 180-2018	Humidifier maintenance				
5	Dehumidification capacity	Verify dehumidification capacity is adequate for summer load (explore/check for excess cycling, cooling coil discharge dewpoint, reheat capacity, latent setpoint). Address sustained mugginess complaints.	Vd	ASHRAE 55-2023; ASHRAE 62.1 §5.12	Latent cooling / dehumidification				
ENCLOSURE & PERIMETER									
6	Window / glazing condition	Inspect occupant-side windows and curtain wall for failed seals, fogged units, broken weatherstripping, and air-infiltration paths. Coordinate repair with envelope contractor; cross-reference over heating, cold-window and draft complaints.	V	ASHRAE 55-2023; building enclosure best practice	Building enclosure performance				
7	Perimeter terminal equipment	Inspect perimeter fin-tube radiation, baseboard, fan-powered VAV, and induction units. Verify controls respond to perimeter call and that supply registers are not blocked.	V	ASHRAE 180-2018	Perimeter conditioning				
8	Shading & solar gain (interior)	Inspect manual / automated shading for damage; reassess perimeter glare-and-heat-gain complaints aligned with the current sun angle.	V	LEED v5 EQ; WELL Light/Thermal	Solar heat gain control				
PERSONAL-COMFORT POLICY & ADAPTIVE MEASURES									
9	Clothing & adaptive policy review	Review the building's clothing / adaptive comfort policy with stakeholders (HR / facilities). Confirm policy is published and consistent with the ASHRAE 55 method in use (graphical, PMV/PPD, or adaptive).	V	ASHRAE 55-2023	Adaptive comfort policy				
10	Personal-comfort devices audit	Walk occupied floors and inventory personal fans, space heaters, and under-desk heaters in use. Verify each device complies with facility electrical / fire safety policy and is approved for use.	V	Facility electrical / fire policy	Personal-comfort device audit				
OCCUPANT-FACING & DOCUMENTATION									
11	Comfort complaints trend	Trend comfort complaints from the past 6 months by zone, season, and type. Identify chronic problem zones for targeted action in the next cycle.	V	ASHRAE 55-2023 Appendix L	Complaint trending				
12	Comfort policy / O&M plan refresh	Walk-through review of the Thermal Comfort Management Plan (setpoints, scheduling, override authority, complaint response, personal-comfort policy). Update as needed.	V	ASHRAE 55-2023; LEED v5 EQ	Comfort management plan				

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Thermal Comfort Preventive Maintenance — Annual Tasks

Annual inspections — the deepest verification cycle short of full TAB / re-commissioning. These tasks comprise the bulk of ASHRAE 55-2023 evaluation in existing buildings and any LEED v5 / WELL thermal-comfort documentation.

Building / Site:

Inspector:

Period:

#	Topic / Equipment	Inspection / Maintenance Task	Type	Source / Reference	Standard Section / Clause	Status	Date Completed	Performed By (Initials)	Findings / Corrective Action
ASHRAE 55 ANNUAL ASSESSMENT									
1	Annual operative-temperature audit	Conduct an annual operative-temperature audit at representative occupied zones using calibrated instruments (air temperature, globe / MRT, RH, air speed). Plot results against the design comfort method (graphical, PMV/PPD, or adaptive).	Vd	ASHRAE 55-2023; ISO 7726	Operative temperature evaluation				
2	Local thermal discomfort survey	Evaluate local thermal discomfort factors per ASHRAE 55: vertical air-temperature difference, floor surface temperature, radiant asymmetry, draft. Document zones exceeding limits.	Vd	ASHRAE 55-2023 §5.3.4	Local thermal discomfort				
3	Annual occupant survey	Conduct an annual occupant thermal-comfort survey per ASHRAE 55 Appendix L (and/or LEED v5). Calculate overall satisfaction; identify zones, seasons, and population segments with persistent dissatisfaction.	Vd	ASHRAE 55-2023 Appendix L; LEED v5 EQ	Occupant survey				
BAS / SENSORS / CONTROLS — ANNUAL									
4	Sensor calibration audit	Audit calibration records for all comfort-relevant sensors: temperature, RH, dewpoint, globe / MRT, air speed (if installed). Re-calibrate per OEM tolerance.	Vd	ASHRAE 55-2023; ISO 7726	Sensor calibration				
5	Control sequence audit	Audit BAS sequences related to comfort: occupied/unoccupied scheduling, setback/setup limits, dual setpoint deadband, supply-air reset, water-temperature reset, and economizer changeover. Verify against current Sequence of Operations.	Vd	ASHRAE 90.1 §6	Control sequence of operation				
6	Override / setpoint audit	Audit all space-level overrides, exception schedules, and adjusted setpoints across the BAS. Remove obsolete overrides; document remaining exceptions with justification.	V	ASHRAE 90.1 §6	BAS override audit				
BUILDING ENCLOSURE — ANNUAL									
7	Air-barrier / infiltration review	Walk the perimeter on a windy or temperature-extreme day. Investigate infiltration at curtain-wall joints, doors, dampers, vestibules, and penetrations. Coordinate envelope repair to reduce drafts and cold-floor effects.	Vd	ASHRAE 90.1 §5; building enclosure	Air leakage / infiltration				
8	Insulation & thermal bridging	Inspect cantilever-soffit, slab-edge, and unique enclosure conditions for thermal bridging contributing to comfort issues (cold floors, cold-corner condensation). Document conditions and remediation plan.	V	ASHRAE 90.1 §5	Thermal bridging				
9	Window / glazing performance	Review glazing condition and any IR-thermography results. Replace failed insulating-glazing units, weatherstripping, or shading where downstream comfort impact is documented.	Vd	Building enclosure; LEED v5 EQ	Glazing performance				
AIR BALANCE & DISTRIBUTION									
10	Annual air-balance verification	Review design documents and most recent TAB report. Verify airflow rates meet design intent at AHU and at representative zones. Spot-check zone airflows; rebalance if widespread deviation.	Vd	ASHRAE 180-2018; ASHRAE 62.1 §5.10.3	Air balance verification				
11	Building pressurization	Verify building is positively pressurized vs. outdoors (where designed) and that zone pressure relationships are maintained. Cross-reference with infiltration / draft complaints.	Vd	ASHRAE 62.1 §5.14 / §5.18	Building pressurization				
12	Stratification & destratification	In tall / stacked spaces, measure floor-to-ceiling stratification. Confirm destratification fans, paddle fans, or other mitigation operate per design.	Vd	ASHRAE 55-2023 §5.3.4	Stratification				
DOCUMENTATION & PROGRAM REVIEW									
13	Thermal Comfort Management Plan	Update the building's Thermal Comfort Management Plan: comfort method in use (graphical / PMV / adaptive), setpoint policy, override authority, personal-comfort policy, complaint procedure, sensor calibration log, and annual survey results.	V	ASHRAE 55-2023; LEED v5 EQ	Comfort management plan				
14	O&M Manual update	Review and update the O&M manual sections covering HVAC scheduling, setpoints, sequence of operation, sensor calibration intervals, and the personal-comfort device policy.	V	ASHRAE 180-2018; ASHRAE 90.1 §6	O&M documentation				
15	Staff training & competency	Provide annual comfort-focused training for O&M staff: ASHRAE 55 fundamentals, common discomfort modes, complaint response, sensor calibration basics, and the personal-comfort policy.	V	ASHRAE 55-2023; LEED v5 EQ	Staff training				

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Thermal Comfort Preventive Maintenance — Multi-Year (2–5 Years) & As-Required

Multi-year tasks include the deeper validation activities (instrument-grade comfort survey, retro-commissioning, enclosure performance studies) and the event-driven actions following tenant changes, building modifications, or complaint clusters. Schedule into a rolling 3-5 year O&M plan.

Building / Site:

Inspector:

Period:

#	Topic / Equipment	Inspection / Maintenance Task	Type	Source / Reference	Standard Section / Clause	Status	Date Completed	Performed By (Initials)	Findings / Corrective Action
EVERY 2 YEARS									
1	Setpoint / comfort policy retro-evaluation	Re-evaluate the building's comfort method (PMV/PPD or adaptive) and setpoint policy based on the past 2 years of survey results, weather patterns, and energy outcomes.	Vd	ASHRAE 55-2023; LEED v5 EQ	Comfort method re-evaluation				
2	VAV / damper / valve retro-commissioning	Comprehensive retro-commissioning of damper assemblies (seals, linkages, full-range travel) and hydronic valves (seat, stem, actuator). For VAV zones, verify zone-level reset, DCV response, and standby behavior.	Vd	ASHRAE 180-2018; ASHRAE 62.1 §5.19	Retro-commissioning				
EVERY 3 YEARS									
3	Sensor validation (calibrated)	Calibrated-instrument validation of temperature, humidity, dewpoint, globe, and air-speed sensors used by the BAS. Replace sensors past OEM service life.	Vd	ASHRAE 55-2023; ASHRAE 62.1 §8.5 Task 7b	Sensor validation				
EVERY 5 YEARS									
5	Instrumented comfort survey	Conduct an instrumented thermal-comfort survey per ASHRAE 55 Appendix L using calibrated instruments at representative zones, paired with an occupant survey. Use to validate or update the comfort method and setpoints.	Vd	ASHRAE 55-2023 Appendix L; ISO 7726	Instrumented comfort survey				
6	Building enclosure performance study	Conduct a building enclosure performance study (IR thermography, blower-door / fan-pressurization, façade inspection) when persistent comfort/infiltration complaints suggest enclosure failure.	Vd	ASHRAE 90.1 §5; ASTM E779/E1827	Enclosure performance				
AS REQUIRED (event-driven)									
7	Tenant fit-out / change of use	After tenant fit-out, change of use, or major reorganization of a space (densification, new equipment loads, new floor finishes), re-evaluate zoning, terminal capacity, and setpoint policy in the affected area.	Vd	ASHRAE 62.1 §8.1.2; ASHRAE 55-2023	Change-of-use review				
8	Comfort complaint cluster	When complaints cluster in a zone (≥ 3 complaints / 30 days, or recurring across seasons), conduct a focused investigation: instrument the zone, audit BAS sequence, verify equipment, and develop a documented corrective action plan.	Vd	ASHRAE 55-2023 Appendix L	Complaint cluster response				
9	Mixed-mode / natural-ventilation review	After façade alterations, neighborhood / micro-climate changes, or a switch in occupancy pattern, re-evaluate mixed-mode and natural-ventilation strategies and interlocks with mechanical systems.	Vd	ASHRAE 62.1 §6.4.3; ASHRAE 55	Mixed-mode review				
10	Extreme-weather event review	After heat waves, cold snaps, or extended utility outages, review setpoint deviation, complaint surge, and equipment performance. Update emergency comfort procedures and resilience plan.	V	ASHRAE Resilience guidance	Resilience / extreme-weather				
11	Discomfort due to improper selected damper and valve characteristics	The specification of dampers and valves requires trained technicians. Improper selections can cause over and under heating/cooling and cycling of inputs. When replacing these devices retain the services of a controls technician skilled in damper and valve characteristics.	V	ASHRAE Resilience guidance	Controls, Commissioning, Balancing				

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Thermal Comfort Preventive Maintenance — Personal Comfort Systems & Mixed-Mode Operation

Dedicated tab for personal-comfort systems (PCS) — task fans, foot warmers, heated/cooled chairs, individual-control devices — and mixed-mode / natural-ventilation operation. These adaptive strategies are explicitly supported by ASHRAE 55-2023 (elevated air-speed allowances, adaptive method) and by WELL Thermal Comfort. Document operation, policy, and electrical safety.

Building / Site:

Inspector:

Period:

#	Topic / Equipment	Inspection / Maintenance Task	Type	Source / Reference	Standard Section / Clause	Status	Date Completed	Performed By (Initials)	Findings / Corrective Action
PERSONAL-COMFORT SYSTEMS (PCS) — POLICY & OPERATION									
1	PCS policy publication	Confirm the building's PCS policy is published: approved device types, where they may be used, electrical safety requirements, and who approves new devices.	V	Facility policy; ASHRAE 55-2023	PCS policy				
2	Approved-device audit	Inventory deployed personal fans, heated/cooled chairs, foot warmers, etc. Verify each device is on the approved list, in good repair, and used per manufacturer instructions.	V	Manufacturer instructions; facility electrical policy	PCS device audit				
3	Elevated air-speed allowance (ASHRAE 55)	Where the building uses ASHRAE 55 elevated air-speed allowance, document the air-speed setpoint and verify occupants have local control of fans per §5.3.3.	V	ASHRAE 55-2023 §5.3.3	Elevated air-speed allowance				
MIXED-MODE & NATURAL VENTILATION									
4	Window operability	Inspect operable windows / vents for free operation, intact weatherstripping, and any failed seals. Verify that occupant-operable controls are accessible.	V	ASHRAE 62.1 §6.4.3	Operable opening operation				
5	Automated control of openings	Verify automated openings operate during occupied periods, and cannot close except during unoccupied periods or when mechanical ventilation is active.	V	ASHRAE 62.1 §6.4.3	Automated window control				
6	HVAC interlock	Verify mechanical heating/cooling is locked out (or stepped back) when windows are open or natural-vent mode is active in a zone. Confirm BAS does not fight the open window.	Vd	ASHRAE 62.1 §6.4.3; ASHRAE 90.1 §6	HVAC / window interlock				
7	Mechanical-vent backup	Verify mechanical-ventilation backup operates when natural ventilation is inadequate (high outdoor temperature, low wind, pollutant event).	Vd	ASHRAE 62.1 §6.4.3	Mechanical backup				
ADAPTIVE COMFORT									
8	Adaptive-method monitoring	Where ASHRAE 55 adaptive method is used (occupant-controlled naturally conditioned spaces), monitor running mean outdoor temperature and 80%/90% acceptability ranges; record exceedances.	Vd	ASHRAE 55-2023 §5.4	Adaptive method				
9	Clothing / activity policy refresh	Confirm the building's clothing / adaptive policy aligns with the comfort method and is communicated to occupants seasonally.	V	ASHRAE 55-2023	Adaptive policy communication				
OCCUPANT FEEDBACK & DOCUMENTATION									
10	Quarterly PCS feedback	Quarterly check-in with users of PCS / mixed-mode spaces; document satisfaction trends and any safety concerns.	V	ASHRAE 55-2023 Appendix L	PCS occupant feedback				
11	Recordkeeping	Maintain a written or electronic record of PCS inventory, mixed-mode operation logs, and corrective actions for the duration required by the AHJ or insurer.	V	Facility recordkeeping policy	PCS / mixed-mode records				

Type Codes:

V = Verify (visual inspection / BAS data, no calibrated tools) | Vd = Validate (calibrated tools, qualified technician)

Thermal Comfort Source & Standards Crosswalk

This crosswalk maps the requirements of ANSI/ASHRAE Standard 55-2023, ANSI/ASHRAE/ACCA Standard 180-2018, ANSI/ASHRAE 62.1 (humidity / pressurization / natural-vent items), ANSI/ASHRAE/IES 90.1 (HVAC control), LEED v5 EQ, and WELL Thermal Comfort to the tabs in this workbook so a reviewer can confirm coverage.

Standard / Rating System	Section / Credit	Title / Topic	Frequency	Where in this Workbook	Review Notes / Basis	Public Reference URL
ANSI/ASHRAE STANDARD 55-2023 — THERMAL ENVIRONMENTAL CONDITIONS FOR HUMAN OCCUPANCY						
ASHRAE 55-2023	§5.2 / §5.3.1	Operative temperature limits (PMV or adaptive method), humidity and air velocity.	Monthly / Annual	Monthly / Annual	Map to BAS trend review and annual operative-temperature audit.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
ASHRAE 55-2023	§5.3.3	Elevated air-speed allowance	Quarterly / Annual	Quarterly / Personal Comfort & Mixed-Mode	Map to PCS policy and elevated-air-speed allowance documentation.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
ASHRAE 55-2023	§5.3.4	Local thermal discomfort — draft, vertical air-temperature difference, floor temperature, radiant asymmetry	Monthly / Annual	Monthly / Annual	Map to perimeter draft check, stratification observation, and annual local-discomfort survey.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
ASHRAE 55-2023	§5.4	Adaptive method (occupant-controlled naturally conditioned spaces)	Quarterly / Annual	Quarterly / Personal Comfort & Mixed-Mode	Map to mixed-mode and adaptive-method monitoring.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
ASHRAE 55-2023	Informative Appendix L	Occupant comfort surveys — content, measurement, evaluation	Annually	Annual / Multi-Year	Map to annual occupant survey and 5-year instrumented survey.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
ANSI/ASHRAE/ACCA STANDARD 180-2018 — HVAC INSPECTION & MAINTENANCE						
ASHRAE 180-2018	Terminal units	VAV/CAV/Fan coil/Radiant inspection	Monthly / Quarterly	Monthly / Quarterly	Map to zone-equipment walks and quarterly performance checks.	https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211
ASHRAE 180-2018	Dampers	Stroke, seal, linkage, fail-safe direction	Quarterly / Multi-year	Quarterly / Multi-Year	Map to quarterly damper exercise and 2-year retro-commissioning.	https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211
ASHRAE 180-2018	Hydronic valves	Modulation, seat, actuator	Quarterly / Multi-year	Quarterly / Multi-Year	Map to quarterly valve stroke and 2-year retro-commissioning.	https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211
ASHRAE 180-2018	Coils	Cooling / heating coil inspection	Semi-Annual / Annual	Semi-Annual / Annual	Map to seasonal AHU start-up and annual deep-clean (cross-ref IAQ tab).	https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211
ASHRAE 180-2018	Sensors	Functional verification of temperature, RH, others	Quarterly / Annual / Multi-year	Quarterly / Annual / Multi-Year	Map to BAS sensor reasonableness, annual calibration audit, and 3-year validation.	https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211
ANSI/ASHRAE STANDARD 62.1 — HUMIDITY / NATURAL VENTILATION / PRESSURIZATION						
ASHRAE 62.1	§5.8 / §5.12	Humidity control and humidity limits	Monthly / Semi-Annual / Annual	Monthly / Semi-Annual / Annual	Map to space-humidity checks and dehumidification capacity verification.	https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2
ASHRAE 62.1	§5.14 / §5.18	Building pressurization and directional airflow	Annually	Annual	Map to annual pressurization verification.	https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2
ASHRAE 62.1	§6.4.3	Natural ventilation systems and operable openings	Annually / Quarterly	Annual / Personal Comfort & Mixed-Mode	Map to operable-opening verification and HVAC interlock.	https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2
ASHRAE 62.1	§8.1.2	Reevaluate when building is altered or use changes	Event-driven	Multi-Year & As-Required	Map to tenant fit-out / change-of-use review.	https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2
ANSI/ASHRAE/IES STANDARD 90.1 — HVAC CONTROL SEQUENCES						
ASHRAE 90.1	§5	Building envelope (relevant to thermal performance)	Annually / Multi-year	Annual / Multi-Year	Map to annual enclosure review and 5-year enclosure performance study.	https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/standard-90-1-2022-energy-standard-for-buildings
ASHRAE 90.1	§6	HVAC sequences of operation — setback, reset, economizer	Quarterly / Annual	Quarterly / Annual	Map to economizer / reset / changeover quarterly checks and annual sequence audit.	https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/standard-90-1-2022-energy-standard-for-buildings
USGBC LEED v5 — EQ THERMAL COMFORT						
LEED v5 EQ	Thermal Comfort — Design & Verification	Comply with ASHRAE 55 method (PMV, or adaptive)	Annually	Annual	Map to annual operative-temperature audit and survey.	https://www.usgbc.org/leed/v5
LEED v5 EQ	Thermal Comfort — Occupant Survey	Distribute occupant survey and address findings	Annually	Annual	Map to ASHRAE 55 Appendix L annual survey.	https://www.usgbc.org/leed/v5
WELL BUILDING STANDARD — THERMAL COMFORT						
WELL Thermal Comfort	Verified thermal performance	Measured space conditions against ASHRAE 55	Annually / Multi-year	Annual / Multi-Year	Map to annual ASHRAE 55 audit and 5-year instrumented survey.	https://standard.wellcertified.com/thermal-comfort
WELL Thermal Comfort	Individual thermal control	Personal-comfort systems and zoning	Quarterly	Personal Comfort & Mixed-Mode	Map to PCS audit and zone-control review.	https://standard.wellcertified.com/thermal-comfort
WELL Thermal Comfort	Radiant heating / cooling support	Radiant systems performance	Quarterly / Annual	Quarterly / Annual	Map to radiant / chilled beam quarterly check.	https://standard.wellcertified.com/thermal-comfort
OCCUPANT-FACING — COMMON NEGATIVE OBSERVATIONS (SOURCE: IEQ Technical Guide)						
IEQ Source	Common Observation	Too hot — space is overheated (PMV, °F/°C, operative temperature)	As observed	Observations Log / Monthly	Prioritize external shading; improve enclosure; relax clothing policy; elevated air-speed/fans; assess heat terminal flow/temps; hydrate.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Too cold — space is underheated (PMV, operative temperature, radiant asymmetry)	As observed	Observations Log / Monthly	Enable passive solar; improve enclosure; allow heavier clothing; personal heaters; prevent drafts; assess heat terminal flow/temps.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Too dry (cracked lips, dry skin, eyes, throat) — lean water vapor / air	As observed	Monthly / Semi-Annual	Improve enclosure / ducting (reduce leakage); confirm ventilation rates; dedicated humidifiers or primary-air humidification; avoid aggressively warm setpoints.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Too muggy (mildew/mold smells, sticky, oppressive) — rich water vapor / air	As observed	Monthly / Semi-Annual	Improve enclosure; confirm ventilation; dedicated dehumidifiers or primary-air dehumidification; avoid aggressively cool setpoints.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Too drafty (cold drafts across ankles, neck) — building envelope or distribution	As observed	Monthly / Annual	Improve enclosure; reassess diffuser locations vs. occupants; move occupants or modify distribution; add interior window treatments.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Cold floors (feet cold)	As observed	Monthly / Annual	Improve enclosure; insulate slab / cantilever; mitigate cold-window drafts; add fabric flooring or insulated footwear.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Cold in basement, hot upstairs — stratification / stack effect	As observed	Monthly / Annual	Improve enclosure; assess flows and temperatures to terminals; add radiant space heating where appropriate.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy
IEQ Source	Common Observation	Inconsistent temperatures (hot here, cold there) — unintended thermal diversity	As observed	Monthly / Annual	Improve enclosure; assess flows / temperatures; add zoning / personal heating-cooling devices.	https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy