

*Tyson's*

C O R N E R  
C E N T E R

1961 Chain Bridge Road, Suite 105 Tysons Corner, VA 22102



## Tenant Design Criteria

Section t Technical Criteria  
Updated: October 2017

## ADDENDUM LOG

August, 2009

*Full Update*

September, 2011

*Waterproof membrane requirement updated*

May, 2012

*Updated per TC*

August, 2012

*Updated Chilled Water Criteria (pg t12: Item 2);  
Updated Plumbing Criteria (pgs t19-t20)*

November, 2012

*Updated HVAC Systems Design (pg t10: Item G4)*

May, 2013

*Updated Roof Penetrations Criteria (pg t17)*

September, 2013

*Updated Water Meter content (t20)*

March, 2014

*Distribution of utilities through exit corridors is prohibited  
with exception (t21)*

October, 2014

*Update in Mechanical Zone 6 VAV Systems (pg t15- pg t16)*

October, 2014

*At grade level electrical conduit is not allowed to be installed  
in the slab (t5)*

December, 2014

*Wiring language updated (t5, #9)*

January, 2015

*Language regarding the waterproofing membrane on page t20  
revised. (t20)*

March, 2015

*Updated Plumbing content to list specific location for main water  
shut off valve to be at eye level. (t20)*

March, 2016

*Added Electric / Water Sub-meter Requirements (t4)*

April, 2016

*Added Water Efficiency language (t21)*

February, 2017

*Added Equipment Controls, Fan Coil Unit Design and Variable  
Air Volume Box Design language*

April, 2017

*Removed language regarding Telephone Service (t5)  
Replaced with language regarding Communications Services (t5)*

October, 2017

*Added information regarding Commissioning Checklist as Exhibit A,  
page t25  
Added information regarding Single Line Diagram as Exhibit B,  
page t26  
Added information regarding Belimo Energy Valve - EV Series as  
Exhibit C, page t27 & t28*

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## ELECTRIC / WATER SUB-METER REQUIREMENTS

As applicable for property, if there is an existing electric or water sub-meter in the Tenant's space, then the Tenant must have the meter recommissioned to ensure proper installation and functionality. Alternatively, the Tenant can choose to install a new meter that meets Macerich's meter specifications. Either option must be performed by a Landlord-approved electrician and verified by Macerich, and will be at the Tenant's sole cost.

### METER SPECS

Tenant may install the meter specified by Macerich or the like. Meter must meet the following criteria:

#### Electric:

- Meters must be revenue grade.
- There must be at least a 6-digit display.
- Meter must be able to read demand (kW) and usage (kWh).
- The meter must capture the electric usage of the entire Tenant space, including HVAC units. If this is not possible, then it must be noted.
- If using a meter with CTs, note if a multiplier is required and what the multiplier is on the face of the meter.

#### Water:

- Meter must be properly sized for the water flow in the space. Generally this means the size of the meter should match the size of the water line, or the meter can be 1/4" smaller than the line. This means that if there is a 1" water line servicing the space, a properly sized meter would be 3/4" or 1".

#### Installation Requirements:

- Meters must be installed by a Landlord approved electrician.
- Installation must be verified and approved by the Operations Manager, or a member of the Operations staff, at the property.
- Proof of inspection must be sent to the Energy Management Department (Alaine Marx, [alaine.marx@macerich.com](mailto:alaine.marx@macerich.com)) and should include the following:
  - Date of installation or recommissioning
  - Picture of the meter at time of installation or recommissioning. Picture should be clear and should display kWh and kW legibly.
  - Confirmation that the meter covers whole tenant space.
  - Meter make and model
  - Units that the meter reads in
  - Multiplier, if applicable

## ELECTRICAL CRITERIA

### General Design/Construction Coordination

The electrical criteria is provided for the purpose of designing the Tenant's electrical system. This criteria is provided as a guideline for Tenant's Engineer. It is the Tenant's responsibility to verify existing conditions and comply with all applicable codes and standards.

1. Conduit and raceway hangers, clamps, light fixtures, junction boxes, supports, etc. must be fastened to joists and/or beams. Do not attach directly to the slab, roof deck, ductwork, piping or conduit above.
2. Tenant's equipment in the Mall electric room must be clearly identified with Tenant's name and space number.
3. Provide access panels at all junction box locations and at smoke detectors above the ceiling.
4. All outlet boxes, floor boxes, wire raceways, power/telephone poles, plug-in molding, wiring devices, hanger supports and other items required for a complete distribution must be furnished and installed by Tenant.
5. Furnish and install power to roof top units, water heater, store fixtures, signage, music systems and any other fixtures or equipment provided by Tenant. All cutting and patching must be provided by Tenant.

Complete Engineered drawings must be submitted to the Landlord's Tenant Coordinator for review and approval. Landlord will review the plans for conformance to basic Mall requirements. The Landlord does not review for electrical design, nor does the Landlord accept responsibility for the Tenant's adherence to governing codes.

***The documents to be submitted for Landlord approval must include the following:***

1. Complete plans and specifications for all electrical work, including lighting, power and one line riser Diagram. Documents must be signed and sealed by a Licensed Engineer in the state where the Shopping Center is located.
2. Drawings must include panel schedules, load calculations and meter information, if applicable.

3. Structural drawings must be submitted for all equipment that will be suspended from the steel structure.

### Power Source

All work required to connect Tenant to the main power source must be performed by Tenant's designated electrician, at Tenant's expense. Exceptions to this requirement may be granted by the Tenant Coordinator.

Tenant is responsible for feeders to the Tenant space, installation of a dry type transformer, panels and complete distribution throughout the Tenant space.

Landlord will provide the main power source for Tenant's connection. Power source will be 277/480v, 3 phase, 4 wire and will be available in the nearest Mall electric room. Tenants are responsible for re-use of, or connection to an existing disconnect switch in the mall electric room and must pull the feeder wires to the Tenant's demised premises. If service from previous Tenant does not exist, Landlord will provide an empty 2" conduit with pull-wire from the mall electric room to the Tenant space. If a larger conduit or service is required, Tenant is responsible for installation of same from the power source to the demised premises.

### Communications Services

1. Landlord has installed a high-speed fiber infrastructure at the Center for purposes of providing voice and data access throughout the Center. All access for Tenant's voice and data services must be sourced through Landlord's designated provider which is currently Granite Telecommunications or such alternative provider as designated by Landlord. The vendor contact for voice and data services can be found in the Tenant Criteria Package under General Information.
2. For all wiring needs in common electrical rooms, a required vendor must be used to maintain the integrity of the electrical room. The vendor contact for low voltage wiring needs can be found in the Tenant Criteria Package under General Information.

## ELECTRICAL CRITERIA (Cont'd.)

### Lighting

Provide a lighting schedule for review in conjunction with a reflected ceiling plan. Lighting must conform to the following guidelines:

1. Display window lighting must be controlled by a time clock and be on during the hours the Shopping Center is open. Display window lighting at the ceiling must be glare-free and at approved levels at the storefront glass line. The light source shall not be visible from the Mall concourse.
2. Recessed incandescent down lights may be used.
3. Exit, emergency and night lights must be provided throughout, as determined by governing codes.
4. Fluorescent lighting in the sales area must be recessed and must use metal parabolic louver type lenses with a minimum of 9 cell configuration for a standard 2' x 2' fixture. Bare lamp fluorescent or fluorescent fixtures with acrylic prismatic lenses may be used only in concealed areas or stock rooms. 2' x 4' fixtures are not permitted in sales or customer areas.
5. Track lighting may be used if the track is painted to match the ceiling color.

Tenant is responsible for lighting system control, including connection to the Building Management system and connection to the Fire Alarm system, if required. All emergency lighting, exit signs, horns and strobes must be provided by Tenant as required by code.

### Material/Equipment Specifications

1. Drawings must include complete material specifications including manufacturer's name and product number and complete schedules of all equipment and fixtures to be installed.
2. All material and equipment must be new and of a commercial grade and must bear Underwriter's labels where such labeling applies.
3. At grade level electrical conduit may be installed at least 4" under the slab and must be in Schedule 40 PVC conduit. But never allowed to be installed in the slab or less than 4" below slab.
4. Floor boxes must be watertight.

5. Pull boxes or junction boxes must be a minimum of 12 gauge galvanized steel outlets. Boxes in walls must be galvanized pressed steel or case metal. Caulk around boxes to eliminate noise transmission.
6. All main and branch feeders and circuitry wiring must be copper. All conductors to have 600 volt insulation type THW, THWN or THHN.
7. Convenience receptacles must be specification grade, 120 volt, 20 amps and be grounding type per NEC.
8. Manual or magnetic starters, switches, contactors, relays, time switches, safety devices, dimmers and other controls must be commercial type with heavy duty ratings and must be installed in strict conformance with the manufacturer's recommendation and applicable codes.
9. Any exposed low voltage wiring must be plenum graded.
10. All wiring of any type must be installed in conduit or must be armored cable (BX). Armored cable will only be allowed for concealed branch circuit wiring within the demised premises. Exposed and/or open wiring of any kind will not be allowed. Flexible conduits must be used for connections to vibrating equipment.
11. Trenching of the slab is not permitted without written permission from the Landlord. Tenant to provide all structural support needed if trenching is permitted, including written certification to the Landlord that the trenching has not affected the integrity or weight capacity of the slab.

### Fire Alarm System - Life Safety

1. If required, Tenant must provide a complete fire alarm detection system within the Tenant space as an extension of the Landlord's building-wide addressable fire alarm system.
2. Tenant is required to use Landlord's designated contractor for installation or removal of the necessary smoke detectors and for connection to the main fire alarm system. System must comply with the requirements of the governing authority.
3. All emergency lighting, exit signs, horns and strobes must be provided by Tenant as required by code.

**\*\*See next page for zone specific Tenant Fire Alarm requirements\*\***

## ELECTRICAL CRITERIA (Cont'd.)

### Zone Specific Fire Alarm Requirements

The following requirements do not replace individual Tenant code requirements based on occupancy or use. This information is general in nature and all questions, specific to this Tenant, should be directed to the Tenant Coordinator.

#### Zones 1 through 5:

Tenants within these zones are not required to install fire alarm systems, unless required by specific use or occupancy. If Tenant HVAC unit is over 2000 CFM, Tenant will be required to install a duct mounted smoke detector, per IMC requirements, connected to the Mall fire alarm system. A connection point is provided adjacent to the Tenant space in the service corridor. The Mall required fire alarm contractor is to be used at Tenant expense.

#### Zone 7:

Tenants in zone 7 are not required to install fire alarm systems unless required by specific use or occupancy. If Tenant HVAC unit is over 2000 CFM, Tenant will be required to install a duct mounted smoke detector, per IMC requirements. There is no connection to the Mall fire alarm system in this zone.

#### Zone 6:

This Tenant zone was previously required to have smoke evacuation and smoke detection systems within each of the Tenant spaces. These are no longer requirements.

Tenants in this zone are required to remove all smoke detection/fire alarm devices, and associated wiring in the Tenant space prior to store opening. The Mall required fire alarm contractor is to be used at Tenant's expense for all fire alarm removals, permitting and re-programming of the Landlord system.

## MECHANICAL CRITERIA

### General Design/Construction Coordination

The mechanical criteria is provided for the purpose of designing the Tenant's heating, ventilating and air conditioning system. This criteria is provided for Tenant's Engineer. It is the Tenant's responsibility to verify existing conditions and comply with all applicable codes and standards.

Complete Engineered drawings must be submitted to Landlord's Tenant Coordinator for review and approval. Landlord will review the plans for conformance to basic Mall requirements as outlined in this criteria. Non-conformance with criteria will be immediate basis for plan rejection. Tenant Engineer shall submit completed checklist and load calculations in concurrence with plans submission. The Landlord does not review for mechanical design, nor does the Landlord accept responsibility for the Tenant's adherence to governing codes.

Tenant space shall be delivered in an "as-is", "where-is" condition, or as specifically noted in the Lease document. Tenant shall be responsible for relocation or extension of mechanical services as required for their design. Additionally, all mechanical equipment associated wiring and piping not being re-used shall be completely removed and disposed of by this Tenant. Do NOT abandon in place.

***The documents to be submitted for Landlord approval must include the following:***

1. Complete plans and specifications covering the heating, ventilating and air conditioning system. Show make, type and performance of all equipment. Documents must be signed and sealed by a Licensed Engineer in the state where the Shopping Center is located. Utilization of equipment schedules similar to those provided in this criteria manual is strongly recommended.
2. Calculations showing the heating and cooling required, including transmission and ventilation losses in the space and heating and cooling provided. For the ventilation supply and exhaust required for the space. Calculations shall be as described in "Load Calculations" included below.
3. Temperature control system data showing make, control and energy management systems.

4. Exhaust system layout including CFM and equipment specifications.
5. Structural details for support of all roof top equipment and equipment suspended from the steel structure.
6. A chilled water piping diagram, if applicable. All chilled water AHU's that utilize outside airside economizer shall have coil freeze protection provided.

### Load Calculations

The Tenant must perform all calculations in accordance with methods set forth in the latest American Society of Heating, Refrigeration and Air Conditioning Engineers' Guide and Data Book and in accordance with good engineering practice. All calculations must be tabulated in a concise, orderly manner. For multiple zone tenants, the outside air calculation spreadsheet provided in this criteria may be utilized to comply with Fairfax County Permit Office.

### Tenant Mechanical Systems:

The type of Tenant mechanical system required will be determined by the Mall zone the Tenant space is located in. Generally, zone 1, 2, 3, 4 and 7 spaces are chilled water systems, zone 6 spaces are on a shared VAV system and zone 5 spaces are on individual rooftop unit systems. There may be exceptions to these conditions. Field verification by the Tenant is required to determine actual field conditions. Please consult the Tenant Coordinator with specific questions.

The mechanical design criteria on pages t8 and t16 of this section are specific to the various zones in the Center. Please refer to the zone maps on pages gi9 and gi10 of the General Information section to identify the zone a Tenant space is located in. Tenant engineer shall design and submit plans as required in the zone specific criteria.

The Tenant is required to submit calculations indicating the heating and cooling loads for the space and calculations for exhaust and make-up air.

Tenants must design for a maximum noise criteria of NC40 for all spaces except kitchens and other similar work areas.





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## MECHANICAL CRITERIA (cont'd.)

### Exhaust Requirements

Tenants whose operation produces objectionable odors such as restaurants, pet shops, hair salons, nail salons and the like must maintain 10% negative air pressure with respect to the Mall by providing make-up air equal to 90% exhaust air volume. Tenant may be required to provide, at Landlord's discretion, a separate make-up outside air supply system to balance Tenant's exhaust system. Spaces that require exhaust must be designed to provide negative air pressure relative to adjoining conditioned spaces to prevent odor

## CHILLED WATER CRITERIA: ZONES 1-4, 7

### MECHANICAL:

1. General: The Tenant provided HVAC system shall be VAV in nature for spaces with multiple zones and/or above approximately 3000 square feet, AHU's/ Mechanical equipment shall be equipped with a full airside economizer system when sufficient outside air and relief is available. Single zone and less than 3000 square feet - constant volume AHU's are allowed with full airside economizer. VAV AHU's shall utilize variable speed drives for the supply and return/relief fans. Control system shall utilize a BacNet compatible/compliant Direct Digital Control system that incorporates reset strategies for the static pressure setpoint and the supply air temperature setpoint (applicable to VAV), based on the loads being served by the AHU.

2. Air Handler Requirements (following information should be provided on the design drawing specifications):

1. Provide AHU submittal(s) to landlord for review. All chilled water AHU submittals must be submitted to landlord and approved by landlord prior to unit being ordered.
2. Commissioning of all AHU's are required once installed and operational. Contractor is responsible for coordinating start-up and commissioning with landlord representatives. Contractor shall provide landlord a minimum of five (5) days notice. (*Example Commissioning Checklist PDF attached as Exhibit A, page t25*)
3. Design Engineer shall note on drawing that the controls submittal shall be provided to landlord for review prior to installation.
4. Contractor is responsible for providing controls submittal to landlord for review and approval to verify compatibility with building system. Submit documents on all control product components prior to installation.
5. Contractor shall submit to landlord control point list prior to installation.
6. Contractor shall submit BACNET conformance compliance statement to landlord prior to installation.
7. See single line diagram in criteria for example of mall's control sequence. (*Example PDF attached as Exhibit B, page t26*)
8. The following are required from the contractor prior to final vendor contract payment:

- a. Certified manufacturer's start-up and test report for all new HVAC units.
- b. Certified air and water balancing test reports.
- c. Bound O&M manuals for all new HVAC units outlining maintenance procedures, parts list, etc. and hard copies of approved shop drawing submittals.
- d. New HVAC units warranty paperwork.

3. This design criteria is intended to guide the Tenant HVAC designer toward the use of a VAV system utilizing variable speed drive based blow through air handling units equipped with full airside economizers, and either return or exhaust/relief fans. Direct drive plug fans are desired but not mandated. Very low face velocity cooling coils are mandated to allow the use of high chilled water supply and return temperatures to improve the chiller plant system efficiency, and to reduce airside pressure drops and fan energy waste to maximize chilled water economizer operation.

4. Design Conditions: Tenant's heating and cooling system design shall be based upon the following conditions:

#### **A. HEATING**

1. Inside dry bulb temperature: Sales 72°F Storage 70°F
2. Outside dry bulb temperature: 10°F
3. Average wind velocity: 7 mph
4. When the space is not occupied, minimum temperature shall at no time go below 55°F and only recirculated air may be used by Tenant provided unit heater.

#### **B. COOLING**

1. Inside dry bulb temperature, sales and storage: 72°F
2. Relative humidity (maximum): 50%
3. Outside dry bulb: 93°F
4. Outside wet bulb: 78°F

#### **C. LOAD FACTORS:**

1. Roof U-Value: 0.084
2. Wall U-Value: 0.300
3. Lighting Density-per Lease Outline Drawing (maximum 3.0 watts per square foot of sales floor or customer accessible areas unless approved by

## CHILLED WATER CRITERIA: ZONES 1-4, 7 (cont'd.)

Landlord, maximum of 1.5 W/SF for back of house operations). Cooling loads associated with lighting densities greater than 3.0 W/SF and 1.5 W/SF shall be cooled by separate tenant provided DX split systems, powered from the tenant meter.

5. Population Density - 1 person per 50 sq. ft. of demised space shall be used when developing the cooling calculations and for fresh air requirements. Sensible heat shall be based on 315 BTUH/person, Latent heat shall be based on 325 BTUH/person. The square footage to be used for this calculation consists of the entire demised area, not just the customer accessible areas.

### D. HVAC CALCULATION CRITERIA:

1. General: All calculations shall be in accordance with all the latest edition of the ASHRAE Fundamentals Guide and Data Book, applicable codes and requirements and good engineering practice. All calculations shall be upon the included form, certified by a registered professional engineer and, submitted for Landlord's engineers' approval with final working drawings.
2. A minimum of 20 CFM of fresh outside air per person, based on the occupancy calculated in section 3.C.4 above, (one person per 50 square feet of demised space) or the code mandated OSA CFM, whichever is greater, shall be used when developing the heating and cooling calculations. Outside code calculation spreadsheet similar to that provided (if requested) shall be provided on plans for satisfactory permit review.
3. Heating Load: Space shall be calculated to maintain the minimum space temperatures indicated with the equipment for day heating loads. However, no credit may be taken for lighting and people.
4. Cooling Load: Cooling load calculations (lights, equipment and occupants) shall take into account all interior heat producing items, as well as the loads imposed by the fresh air component and the walls, windows, skylights etc. For spaces utilizing full airside economizer, loads exceeding 40.0 BTU per hour per square foot (300 SF/Ton) shall be cooled by separate tenant provided supplemental split system AC unit, powered from the tenant meter, unless approved in advance by the Landlord. For economizer limited tenants, loads exceeding 31.1 BTU per hour per square foot (385 SF/Ton) shall be cooled by a separate tenant provided supplemental split system AC unit.

5. The peak design CFM for the AHU shall be based on either the design supply air temperature for the unit on the peak load day, or 63°F supply air temperature based on the peak loads in existence when the OSA temperature is 60°F, whichever is higher.
6. Scope: Tenant shall submit to Landlord calculations for the following:
  - a. Peak cooling load, and cooling load at 60°F ambient with full occupancy and equipment loads.
  - b. Peak heating load
  - c. Instantaneous cooling load for each space served by an individual terminal unit if more than one is required.
  - d. Circulated CFM required for peak cooling load, using 55°F supply air temperature, and ac 63°F supply air temperature.
  - e. Instantaneous heating load for each heated space.
  - f. Toilet room exhaust air calculation, including static pressure.
  - g. Static pressures on the low pressure duct system connected to the VAV terminal.
  - h. Exhaust quantities and static pressure for kitchen for kitchen exhaust.
  - i. Tenant VAV system shall be designed to provide no less than 1.75 CFM per demised S.F.

### E. HEATING ENERGY SUPPLY

7. Heating energy supply will be electric and Tenant will make available from Tenant's electric service to power Tenant provided unit heaters.

### F. COOLING MEDIA/EQUIPMENT:

1. For the purposes of sizing and selecting the AHU and cooling coils, the temperature of the chilled water supply provided by landlord, if applicable, shall not be less than 50 degrees Fahrenheit EWT and the temperature of the chilled water return provided back to the system by the tenant AHU shall not be less than 64 degrees Fahrenheit.
2. If Tenant uses chilled water service it shall be made available during normal "business hours" whenever outdoor temperature is equal to or above 60 degrees Fahrenheit. The temperature will be varied based on the cooling loads being served by the chiller plant, and may be higher or lower than described in this Design Criteria at any given time of day or time of the year.

## CHILLED WATER CRITERIA: ZONES 1-4, 7 (cont'd.)

3. Minimum working pressure of all Tenants' chilled water equipment will be 125 PSIG.
4. Maximum allowable pressure drop through all Tenant's chilled water piping and equipment (measured at connecting points to main) shall be fifteen feet (15'-0") Water Gauge (WG) at the 14 degree temperature differential described above.
5. The cooling coil shall be 5/8" minimum tube diameter, copper with a 0.28" wall thickness minimum. The fin thickness shall be 0.008" minimum.
6. The maximum distance between cooling coil drain pans that pass 100% of the way thru the coil finned surface area, shall be 24". If the cooling coils are taller than 24", provide intermediate drain pans to limit the vertical distance between drain pans to 24" maximum.
7. The cooling coil drain pans and cooling coil casings shall be 304 stainless steel, of adequate thickness to provide the intended duty, and double sloped to encourage water drainage from the drain pans. The drain pans shall drain dry within 15 minutes of the air handling unit being shut down.

### **For Tenant's with limited/partial airside economizer capability**

1. Tenant to provide a fresh air delivery system that will deliver a minimum of 20 CFM per person of fresh air at a 50 square foot per person occupancy rate. The tenant shall be responsible for installing an economizer system (fresh air intake duct and return fan system with exhaust ducting) that will utilize the greatest economically feasible amount of fresh air possible.
2. The cooling coils in the air handling units, the AHU fan system and the distribution ductwork must all be increased in size to meet the tenant calculated peak winter cooling loads when the chiller plant is delivering 60 degree F chilled water temperatures and the ambient conditions are 60 degree F or less. The load being served by the AHU system shall be reduced by the amount of load that can be served with the design volume of fresh air at a 63 degree F supply air temperature from the economizer system.
3. The chiller plant system will be providing flow to the loads at an expected chilled water temperature differential of 10 degree F, so the design chilled water return temperature shall be 70 degree F.

4. Since the supply air temperature will be higher than would be delivered in the summer, the supply air volume shall be increased to accommodate the peak loads when using the higher AHU supply air temperatures.
5. The AHU's shall be blow thru in design, to reduce the supply air temperature as far as possible, while increasing the chilled water return temperature.

### **For Restaurants**

1. There is no requirement for full airside economizer. The tenant will have to provide a fresh air delivery that will deliver 20 CFM per person of fresh air at a 50 square foot per person occupancy rate.
2. The cooling coils in the air handling units, the AHU fan system and the distribution ductwork must all be increased in size to meet the tenant calculated peak winter cooling loads when the chiller plant is delivering 60 degree F chilled water temperatures and the ambient conditions are 60 degree F or less. The load being served by the AHU system shall be reduced by the amount of load that can be served with the design volume of fresh air at a 63 degree F supply air temperature from the economizer system.
3. The chiller plant system will be providing flow to the loads at an expected chilled water temperature differential of 10 degree F, so the design chilled water return temperature shall be 70 degree F.
4. Since the supply air temperature will be higher than would be delivered in the summer, the supply air volume shall be increased to accommodate the peak loads when using the higher AHU supply air temperatures.
5. The AHU's shall be blow thru in design, to reduce the supply air temperature as far as possible, while increasing the chilled water return temperature.

### **G. HVAC SYSTEMS DESIGN:**

1. All Tenant HVAC systems must utilize computerized Direct Digital Controls that are native BacNet compatible/compliant. No pneumatic or electric/electronic controls are permitted.
2. Maximum outside air supply and re-circulated shall be equal to one hundred percent (100%) of CFM circulated – a full airside economizer is required.

### CHILLED WATER CRITERIA: ZONES 1-4, 7 (cont'd.)

3. Minimum outside air supply shall be based on the higher of either (20 CFM per person, calculated at one person per 50 square feet of demised space, or the minimum required by applicable codes), plus any additional requirements to maintain air supply equal to total air exhausted. This shall not exceed twenty five percent (25%) of total air volume supplied. The Tenant's air handling system must be designed to operate under all conditions, without the need to relieve air into or take air from the adjacent enclosed mall.
4. Fresh air dampers, exhaust fan discharge dampers and relief air dampers shall be low leakage, opposed blade type. Maximum open area face velocity of the various damper systems shall not exceed 800 FPM. Relief/exhaust/return fan with vfd or barometric relief damper/hood shall be provided for 100% outside air economizer mode.
5. Air pressure drop in ductwork shall not exceed 0.075 inches H<sub>2</sub>O per 100 ft. of straight run. The maximum air velocity in the main duct runs shall not exceed 1,500 FPM, and the maximum air velocity in the duct run-outs to the diffusers shall be 500 FPM. Duct tap-offs shall be made at a 45 degree angle in the direction of air flow. All branches and take-offs shall be equipped with volume controlling devices. All ductwork shall be designed, provided, and installed in accordance with the latest methods use in ASHRAE Guide and the SMACNA Standards.
6. Motors shall be designed for variable speed inverter duty (applicable to VAV AHU only) and be rated as premium efficiency based on continuous duty NEMA Standards. Motors rated ½ HP and larger shall be 3-phase, 480 volts, motors rated less than ½ HP shall be single-phase, 120 volts.
7. Blower motors and other equipment vibrating shall be isolated from unit casing and from construction with vibration absorbing mountings.
8. Ceiling diffusers shall be provided with volume control.
9. Level One Tenants will need special Landlord permission for shafts or venting through Level Two spaces

#### Heating and Cooling Air Supply System for Existing Level Two Tenants:

- a. Chilled water cooling coil, as part of air handling unit described, with the following characteristics:

1. Entering minimum water temperature: 50 degrees F.
2. Water temperature rise across coil: 14 degrees F.
3. Minimum number of rows: 8 rows. Fin per inch count :12 FPI, no more, no less. Coil thickness minimum is 0.028", fin thickness minimum is 0.008" minimum.
4. Maximum air pressure drop through coil: 0.70 in WC
5. Maximum air face velocity across coil finned surface area: 300 FPM for draw through cooling coil configurations, 350 FPM for blow through cooling coil configurations.
6. Maximum water pressure drop through coil (including valves, devices, and connected piping: 15 ft.
  - a. BacNet room thermostat governed full modulating two-way throttling type control valve. Belimo Energy Valve - EV Series. (See *example attached as Exhibit C*) Provide with inlet strainer, balancing valve on chilled water circuit of coil, manual and automatic air vents piped to floor sinks, freezestats, firestats, one hundred percent (100%) O.A. Economizer, BacNet compliant DDC controls system as described elsewhere, return or relief/exhaust fan, air flow switches and high limit safety cut out for electric coils.
  - b. Electric resistance type heating coil(s) installed in Tenant provided unit heaters shall not exceed 7.5 KW per step and be thermostatically controlled by the DDC system supply air temperature setpoint. The heating system control signal shall be 0% to 100% heating unit output based on the space temperature being between -1.5°F and -5°F of the space temperature setpoint.
  - c. All supply duct work and chilled water piping shall be insulated one inch (1") and condensate lines one-half inch (1/2") with glass fiber with non-combustible UL rated vapor barrier.
  - d. Tenant shall submit the following information where applicable, for approval and acceptance in writing, before ordering any work to commence.
    - e. Heating coil data showing.
      1. Make, type and capacity.
      2. Coil width, length and power requirements and number of circuits.
      3. CFM handled by coil and coil face velocity (ft/min).
      4. Entering and leaving air temperatures. BTU provided by air.

## CHILLED WATER CRITERIA: ZONES 1-4, 7 (cont'd.)

5. Air pressure drop through coils (inches of water).
- f. Cooling coil showing:
1. Make, type and cooling capacity, blow-thru or draw-thru.
  2. Header width, length and number of circuits.
  3. CFM handled by coil and coil face velocity (ft/min).
  4. Entering and leaving air dry and wet bulb, dew point and entering and leaving water temperatures and total heat of entering and leaving air.
  5. GPM of water used and coil water velocity (ft/min).
  6. Water pressure drop through coil (ft. of water).
  7. Air pressure drop through coil (WG – inches of water).
  8. Water pressure drop through the cooling system from the POC's at the entry to the demised space, through all of the Tenant equipment and back to the POC.
  9. Coil thickness
  10. Fin thickness
- g. Supply fan data:
1. Make and type.
  2. Air delivery. CFM using 63°F supply air temperature and CFM using 55°F supply air temperature, and CFM per square foot of demised space at these two conditions.
  3. Static pressure developed, static pressure required with 1" pressure drop across a dirty air filter bank.
  4. Motor RPM and HP using 63°F supply air temperature and motor RPM and HP using 55°F supply air temperature. Fan RPM at these two conditions.
  5. Type, size and capacity of air filters.
  6. Voltage, Amps, KW.
- h. Unit heater data:
1. Make, type and size (motor HP and RPM for unit heaters).
  2. BTU/Hr. rating.
  3. Entering and leaving air temperatures CFM circulated.
  4. Voltage, Amps, kW per stage and total kW.
- i. Temperature control system data:
1. General: Monitoring points shall be made available to the Landlord

system for the purposes of improving overall system energy efficiency and also tenant comfort. These points shall be BacNet compatible controls available from each cooling or heating unit to connect to the Landlord system:

- Supply air temperature setpoint.
  - Actual supply air temperature
  - Chilled water valve position command (0% to 100%)
  - Static pressure setpoint
  - Actual supply air static pressure
  - Thermostat setpoint (for each thermostat)
  - Actual temperature at each thermostat
  - Return air temperature
  - Mixed air temperature
  - Supply fan kW (from Variable Speed Drive or kW transducer)
  - Return/Relief/Exhaust fan kW (from Variable Speed Drive or kW transducer)
  - AHU status (on-off)
  - Supply fan speed
  - Return/relief/exhaust fan speed
  - Unit heater status (on-off)
  - Smoke Detector Monitor Input
  - Unit heater total kW draw (analog signal)
2. Provide the BacNet interface hardware and software required to send this information to the Landlord DDC system. The Landlord will provide the cable and hardware necessary to receive this information. Provide technical assistance from your DDC system provider to facilitate this interface. Provide IP connection in Tenant control panel for future mall connection for monitoring.
3. Make and control diagram and description, and equipment submittals
- j. Sequence of Control Operation:
1. Seasonal selection shall be by fully automatic "Summer – Winter" switch based on outside air temperature.
  2. These are generic sequences, the Tenant HVAC Design Engineer shall develop sequences that follow these basic guidelines and reset strategies, adapted for the specific needs of the individual tenant.

## CHILLED WATER CRITERIA: ZONES 1-4, 7 (cont'd.)

### k. Heating and ventilating cycle:

- Day cycle (9 am – 10 p.m.) on days the Demised Premises is open for business.

- a. BacNet compatible/compliant DDC control system shall energize the supply fan (the fan shall run continuously during the day cycle, utilizing the variable speed drive to maintain the static pressure setpoint) and the electric heating coil. If a separate unit heater is utilized, the BacNet DDC system shall also have control of that equipment. Controller of electric heating coil will gradually turn on all circuits. The BacNet compatible/compliant DDC control system shall also energize the outside air, return air and relief air damper motors and place them under the control of the daytime space thermostat setpoint.

- b. As space temperature increases and approaches the space thermostat setting, the heating coil multi-step controller shall modulate toward the “off” position. When the space temperature has reached 1.5 °F below the set point of the thermostat the controller shall have modulated the heating coils to “off”.

- c. The outside air damper shall remain closed until the space temperature approaches the modulating range of the day time space thermostat setpoint at which time a set of contacts controlled by the DDC system shall energize a minimum positioning switch to open the outside air damper to minimum position. An auxiliary switch mounted on the outside air damper motor shall modulate the relief air damper motor open as required. When heating coil control is in the “off” position (coil de-energized) and on a further rise in a room temperature, the economizer control system is enabled and the relief dampers open and return air damper closed to maintain temperature. The return/exhaust/relief fan speed shall be controlled to maintain the relative pressure between the Tenant space and the mall space as described elsewhere. The Freezestat shall override entire system. If the mixed air temperature drops below 45°F, an audible and visual alarm will be sent to the tenants from their DDC system, and the chilled water valve will be opened to the 100% open position. The return/relief/exhaust fan shall be shut down, the relief and fresh air dampers shall be commanded closed and the supply fan shall be shut down.

- d. When temperature increases above 48°F, the reverse shall occur.

- e. Low limit controller located in the discharge air shall override the BacNet space thermostat control logic to maintain a minimum discharge air temperature.

### • Night Cycle

- a. BacNet compatible/compliant DDC control system shall de-energize the fan circuit and damper motors and place fan operation under the control of the night space thermostat setpoint. The DDC system shall operate the fan intermittently to maintain space temperature. Outside and relief air dampers shall be closed and return air damper open; electric coil shall be operating as in daytime.

### 1. Interlocks

- a. Interlock will keep electric coil(s) de-energized whenever respective supply fan is not running.
- b. Whenever electric coil is de-energized, controller shall return to “off” position. The electric coils shall always start unloaded.
- c. Chilled water coil control valve shall be closed whenever the heating coil system is in operation, except as described by Freezestat logic.

### 2. Cooling Cycle

#### • Day Cycle

- a. BacNet compatible/compliant DDC control system shall energize the supply fan (the fan shall run continuously during the day cycle) and shall energize the minimum positioning switch of the outside air damper opening same to the minimum position. The economizer system shall be enabled if the outside air temperature is 10°F (adjustable) lower than the return air temperature.

- b. The DDC system shall vary chilled water flow rate by means of modulating the control valve of the cooling coil to maintain the AHU supply air temperature setpoint. The AHU supply air temperature setpoint shall be reset based on the offset of the space temperature from the space temperature setpoint as described below. The space temperature shall be compared to the space temperature

## MECHANICAL ZONE 6 VAV SYSTEMS

setpoint in control at the zone thermostat. If the space temperature is above or below the setpoint as described below, the supply air temperature setpoint and the static pressure setpoint for the AHU shall be gradually decreased or increased in a proportional manner, each minute, as described next:

### 1. Supply Air Temperature Setpoint Reset Sequence

- If the space temperature is between  $-0.5^{\circ}\text{F}$  below the space temperature setpoint and  $3.5^{\circ}\text{F}$  above the space temperature setpoint and the space temperature is increasing, proportionally decrease the supply air temperature setpoint that controls the cooling coil control valve by  $0.02^{\circ}\text{F}$  (adjustable) to  $0.15^{\circ}\text{F}$  (adjustable) each minute that the unit is in operation.
- If the space temperature is more than  $1.5^{\circ}\text{F}$  above the space temperature setpoint whether or not the space temperature is increasing, decrease the supply air temperature setpoint that controls the cooling coil control valve by  $0.12^{\circ}\text{F}$  (adjustable) each minute that the unit is in operation, in addition to the reset described above. A minimum supply air temperature setpoint of  $55^{\circ}\text{F}$  shall be utilized.
- If the space temperature is between  $+0.5^{\circ}\text{F}$  above the space temperature setpoint and  $-3.5^{\circ}\text{F}$  below the space temperature setpoint, and the space temperature is decreasing, proportionally increase the supply air temperature setpoint that controls the cooling coil control valve by  $0.008^{\circ}\text{F}$  (adjustable) to  $0.10^{\circ}\text{F}$  (adjustable) each minute that the unit is in operation.
- If the space temperature is more than  $0.75^{\circ}\text{F}$  below the space temperature setpoint whether or not the space temperature is decreasing, increase the supply air temperature setpoint that controls the cooling coil control valve by  $0.08^{\circ}\text{F}$  (adjustable) each minute that the unit is in operation, in addition to the reset described above. A maximum supply air temperature setpoint of  $72^{\circ}\text{F}$  shall be utilized.
- The supply air temperature setpoint shall be started when the AHU starts based on a proportional reset: if the space temperature offset from setpoint is between  $-2^{\circ}\text{F}$  and  $+2^{\circ}\text{F}$ , start the AHU with the supply air temperature setpoint between  $72^{\circ}\text{F}$  and  $55^{\circ}\text{F}$ . Run with this setpoint for a 10 minute period, then release the setpoint to the automatic reset routines.

### 2. Supply Air Static Pressure Setpoint Reset Sequence

- If the space temperature is between  $-0.5^{\circ}\text{F}$  below the space temperature setpoint and  $3.5^{\circ}\text{F}$  above the space temperature setpoint, and the space temperature is increasing, proportionally increase the supply fan static pressure setpoint that controls the variable speed drive for the supply fan by 0.01 inches WC (adjustable) to 0.125 inches WC (adjustable) each minute that the unit is in operation.
- If the space temperature is more than  $1.25^{\circ}\text{F}$  above the space temperature setpoint whether or not the space temperature is increasing, increase the supply fan static pressure setpoint that controls the variable speed drive for the supply fan by 0.08 inches WC (adjustable) each minute that the unit is in operation, in addition to the reset described above. A maximum supply air static pressure setpoint of 1.50 inches WC, as measured at 10' from the discharge of the AHU shall be utilized.
- If the space temperature is between  $+1.5^{\circ}\text{F}$  above the space temperature setpoint and  $-3.5^{\circ}\text{F}$  below the space temperature setpoint, and the space temperature is decreasing, decrease the supply fan static pressure setpoint that controls the variable speed drive for the supply fan by 0.005 inches WC (adjustable) to 0.025 inches WC (adjustable) each minute that the unit is in operation.
- If the space temperature is more than  $-0.75^{\circ}\text{F}$  below the space temperature setpoint whether or not the space temperature is decreasing, decrease the supply fan static pressure setpoint that controls the variable speed drive for the supply fan by 0.008 inches WC (adjustable) each minute that the unit is in operation, in addition to the reset described above. A minimum supply air static pressure setpoint of 0.45 inches WC, as measured at 10' from the discharge of the AHU shall be utilized.
- If the heating system is enabled, set the static pressure setpoint to 1.5" WC and disable the static pressure resets. At fan startup, the initial static pressure setpoint shall be 1.5" WC. The resets shall be enabled once the fan has been enabled without the heating system being enabled for 10 minutes.
- Night cycle



## MECHANICAL ZONE 6 VAV SYSTEMS (cont'd.)

a. This BacNet compatible/compliant DDC control system shall de-energize all systems.

3. Heating and Cooling Air Supply System for Level One and New Construction Tenants: Refer to Design Criteria set forth above in Section C, on page t8. Heating and Cooling Air Supply System for Existing Level Two Tenants with the following exceptions

a. Total pressure drop of the low velocity system shall not exceed 0.25 inches.

b. Heating requirements of F-Set exterior wall losses (Tenant with walls adjacent to the exterior of the building) or roof losses (Tenants on the second floor) shall be installed by Tenant. Heating equipment shall be sized to maintain 72°F in the space, with an outdoor temperature of 10°F. The heating shall be accomplished by means other than a re-heat system on the VAV cooling system. Heating coil shall be 480 volt, 3 phase, 3 wire and shall be equipped with a flow switch to prevent the coil from being energized without positive airflow.

1. Design Conditions: Tenant's heating and cooling system design shall be based upon the following conditions:

### A. Heating:

1. Inside dry bulb temperature: Sales 72°F; Storage 70°F.
2. Outside dry bulb temperature: 10°F.
3. Average wind velocity: 7 mph
4. When the space is not occupied, minimum temperature shall at no time go below 55°F and only re-circulated air may be used.

### B. Cooling:

1. Inside dry bulb temperature: 72°F.
2. Relative humidity (maximum): 50%.
3. Outside dry bulb: 93°F.
4. Outside wet bulb: 78°F.

### C. Load Factors:

1. Roof U-Value: 0.084.
2. Wall U-Value: 0.300.
3. Lighting Density- per Lease Outline Drawing (maximum 3.0 watts per square foot of sales floor or customer accessible areas unless approved

by Landlord, maximum of 1.5 watts per square foot for back of house operations). Cooling loads associated with lighting densities greater than 3.0 watts per square foot and 1.5 watts per square foot shall be cooled by separate Tenant provided DX split systems, powered from the Tenant electric panel.

4. Population Density- 1 person per 50 square feet of demised space shall be used when developing the cooling calculations. Sensible heat shall be based on 315 BTUH/person. Latent heat shall be based on 325 BTUH/person. The square footage to be used for this calculation consists of the entire demised area, not just the customer accessible areas.

## D. EQUIPMENT CONTROLS:

All HVAC energy management controls shall be purchased through and installed by Landlord's required controls contractor at Tenant's expense. Tenant shall contract directly with Landlord's required controls contractor to install a fully functional direct digital control (DDC) system that must be interfaced into the Landlord's building automation system (BAS). These controls shall provide the following data at a minimum:

- Space Temperature
- Supply Air Temperature
- Return Air Temperature
- Fan Status (Binary Current Transducer)
- Chilled water Valve Position
- Fan Start/Stop

Tenant shall purchase a new chilled water valve from Landlord's control contractor at Tenant's expense. Automated chilled water valves are to be installed by Tenant's mechanical contractor and wired by Landlord's control contractor at Tenant's expense. Tenant is not allowed access to the Landlord's BAS. If a Tenant desires to monitor space conditions, then Tenant is allowed to install, at their expense a stand-alone BAS to monitor conditions within their space if desired. Any stand-alone monitoring system shall not be attached to the Landlord's BAS in any way.

Tenant shall contract directly with the Landlord's required controls contractor to remove all DDC components and disconnect all network cabling before demolition.

## MECHANICAL ZONE 6 VAV SYSTEMS (cont'd.)

Tenant's General Contractor shall be held responsible to maintain the integrity of the BAS network cable within their space during all phases of construction. General Contractor shall bear sole responsibility for any damage or disruption to the BAS network.

All new tenant HVAC and lighting controls must meet the following specifications:

Open protocol, BACnet, based communications backbone.

New controllers must be natively tied into existing Tridium Niagara based BMCS.

Macerich Preferred controllers are BACnet Testing Laboratories (BTL approved and meet all requirements for BACnet advanced application controllers (B-AAC).

### E. FAN COIL UNIT SPECIFICATIONS & REQUIREMENTS:

Tenant must replace existing fan coil units serving their space with new if existing units are over 10 years old. All new fan coil units must be either Carrier 39L or Trane (LPC or MCC) series units. If existing fan coil unit is less than 10 years old, the unit must be completely refurbished by the Landlords approved Mechanical Contractor at the Tenant's expense. Contact Dave Mure' with Mechanical Air Design at 480-483-9622 for pricing.

All fan coil units within the Tenant's space must have a secondary drain pan installed underneath each unit.

All fan coil units must have a strainer and circuit setter installed at each unit with a pressure / temperature plug installed on the inlet and outlet of the system, as well as across the strainer. The strainer must have a ball type isolation valve installed at the drain port for service.

All fan coil units must have an automatic air vent installed with the discharge piped to the condensate drain. A ball type isolation valve must be installed between the air vent and chilled water line. Air vents must be installed at the highest point of the supply waterline.

Each fan coil unit must have isolation valves installed on both the supply and return chilled water lines. A ball type isolation valve must be used.

Chilled water lines to each fan coil unit must be insulated with fiberglass insulation.

All fan coil units must have disposable 2" pleated air filters. All units must accommodate one or more of the following filter sizes in any combination: (16x20x2, 16x25x2, 20x20x2, 20x25x2)

Fan coil units are not allowed to share taps off of the main chilled water loop. Each fan coil unit must have a dedicated tap off of the main loop. All new taps must be performed by the Landlord's required Mechanical Contractor, at the Tenant's expense. Contact Dave Mure' with Mechanical Air Design at 480-483-9622 for this pricing.

The fan coil unit must not have anything attached to it, nor within two feet around each unit. This includes all conduits and piping of any kind that is not directly for the unit. The unit must not be up against any walls or other structural members that would not allow for the minimum 2' - 0" of clearance around the entire unit.

All condensate drain lines must use copper piping. PVC piping will not be allowed. A union type fitting must be installed in the condensate drain line within 18" of the fan coil unit. All condensate drain lines should be piped to a floor sink within the Tenant's space, if possible. The drain line must be insulated with fiberglass insulation. Condensate pumps are not allowed. Condensate drains on draw-through units must have a p-trap equal to the negative static pressure plus one inch. Condensate drains on blow-through units must have a p-trap equal to the fan total static pressure.

Chilled water valve must be purchased through the Landlord's required controls contractor, and installed by the Tenant's mechanical contractor. Chilled water valve must be two-way only.

### F. VARIABLE AIR VOLUME BOXES (PHASE II ONLY)

All new VAV boxes shall be Titus brand.

No fan powered VAV boxes or electric duct heaters allowed.

All new VAV boxes must be installed and ducted back to the Landlord's main trunk line by the Landlord's required mechanical contractor, at the Tenant's expense.

## MECHANICAL ZONE 6 VAV SYSTEMS (cont'd.)

The maximum pressure drop after the VAV box shall not exceed .25"

Duct penetrations at the Landlord's main trunk line must not exceed the size of the inlet at the VAV box by more than one nominal size.

Maintain at least 3 duct diameters of straight ductwork prior to the inlet of the VAV box.

### G. HVAC Calculation Criteria:

1. General: All calculations shall be in accordance with all the latest edition of the ASHRAE Fundamentals Guide and Data Book applicable codes and requirements and good engineering practice. All Calculations shall certified by a registered professional engineer and submitted for Landlord's engineers' approval with final working drawings.
2. Provide, at minimum, code required outside air based on the occupancy calculated in section 1.C.4 above (one person per 50 square feet of demised space) or code required occupancy (whichever is greater) when developing the heating and cooling calculations.
3. Heating Load: Space shall be calculated to maintain the minimum space temperatures indicated with the equipment for day heating loads. However, no credit may be taken for lighting and people. Landlord does not provide heating. Landlord VAV system provides cooling only.
4. Cooling Load: Cooling load calculations (lights and occupants) shall take into account all interior producing items, not to exceed 40.0 BTU per hour per square foot (300 SF/TON) of the Demised Premises. Cooling loads in excess of this amount shall be cooled by separate Tenant provided DX split systems, powered from the Tenant electric panel.
5. Scope: Tenant shall submit to Landlord calculations for the following:
  - a. Peak cooling load.
  - b. Peak heating load.
  - c. Instantaneous cooling load for each space served by an individual VAV Box if more than one is required.

- d. Instantaneous heating load for each heated space.
- e. Toilet room exhaust air calculation, including static pressure.
- f. Exhaust quantities and static pressure for kitchen exhaust
- g. Landlord VAV system designed to provide 58°F supply air temperature on peak cooling days.

### H. Heating Energy Supply:

1. Heating energy supply will be electric and Tenant will make available from Tenant's electric service. Tenant will provide unit heating as required to condition the space.

### I. Cooling Media:

1. The owner will be providing cooled supply air to the Tenant spaces. Landlord VAV system is designed to provide 58°F supply air temperature.
2. If Tenant uses cooling air from the Landlord VAV system, it shall be made available during normal mall "business hours".
3. Minimum working pressure of all Tenants' ductwork, equipment and VAV boxes will be 4" Water Gauge (WG).
4. Maximum allowable pressure drop through all Tenant's air distribution systems and VAV boxes (measured at connecting point to main ductwork) shall be one inch (1") Water Gauge (WG). This means that the VAV box will need to be sized to deliver the required design air flow at 58°F dry bulb temperature at approximately 0.5"WG, if the remainder of the Tenant ductwork system has a pressure drop of 0.5" WG.

### J. Ventilation Systems Designs:

1. All Tenant HVAC systems must utilize electronic controls with BACNET controls/compatibility. No pneumatic controls are permitted. Tenant control systems are local to the Tenant premise only. No connection to Mall control system is required.
2. Minimum outside air supply shall be based on the greater of either occupancy calculated in section 1.C.4 above, (one person per 50 square feet of demised space) or the code mandated OSA CFM, plus any additional requirements to maintain air supply equal to total air

## MECHANICAL ZONE 6 VAV SYSTEMS (cont'd.)

exhausted. This shall not exceed twenty percent (20%) of total air volume supplied.

Tenant shall submit the following information where applicable, for approval and acceptance in writing, before ordering any work to commence:

a. Unit Heater Data:

1. Make, type and size (motor HP and RPM for unit heaters).
2. BTU/Hr. rating.
3. Entering and leaving air temperatures, CFM circulated.
4. Voltage.
5. kW rating per stage of heating

b. Temperature Control System Data:

1. Make and control diagram and description

c. Sequence of Control Operation:

1. Seasonal selection shall be by manual "Summer – Winter" switch or by automatic change-over relay activated by outdoor thermostat.

**K. Heating Cycle:**

1. Day cycle (9am- 10pm) on days the Demised Premises is open for business.

a. Time clock and thermostat shall energize the unit heater and the electric heating coil. Controller of coil will gradually turn on and off all circuits.

b. As space temperature approaches the space thermostat setting, the heating coil multi-step controller shall modulate toward the "off" position. When the space temperature has reached the set point of the thermostat the controller shall have modulated to "off".

2. Night Cycle

a. Time clock shall de-energize the fan circuit and damper motors and place fan operation under the control of the night space thermostat. The thermostat shall operate the fan intermittently to maintain space temperature. Electric coil shall be operating as in daytime.

**L. Interlocks:**

1. Interlock will keep electric coil(s) de-energized whenever respective unit heater is not running.
2. Whenever electric coil is de-energized, controller shall return to "off" position. Coil shall always start unloaded.

The exhaust fan must be interlocked with the light switches for the store customer service area.

The combined HVAC and exhaust system must be in operation during all hours that the Tenant is open for business.

## MECHANICAL CRITERIA (cont'd.)

### Kitchen Exhaust Systems

Kitchen exhaust systems are subject to Landlord's review to ensure the exhaust does not compromise the ventilation air of adjacent Mall roof top units. Kitchen exhaust systems are subject to the following criteria:

1. The exhaust fan must be a SWSI centrifugal fan which must be fitted with a minimum 10'-0" stainless steel upblast. Guy wires must be attached to the roof in order to secure the stack. Use the Mall roofer for connection of the guy wires.
2. A "Grease Guard" grease containment system (or approved equal) must be installed to protect the Landlord's roof. A quarterly maintenance program must be in-place for the grease containment units. Proof of the maintenance contract must be presented to Landlord prior to the store opening.

### Roof Penetrations

If use of roof top units, roof-type supplemental supply, condensing units or exhaust air units by the Tenant is permitted by the Landlord, units must be located on that part of the roof of the building directly above the demised premises as designated by Landlord. Tenant must provide and install all necessary piping and other necessary appurtenances for the operation of the roof top equipment. To the extent any of Tenant's equipment is to be located on the roof, the Tenant agrees to erect roof units in accordance with the requirements of the Landlord and the Tenant further agrees to repair any and all damage to the roof and structure caused by hoisting installation and the maintenance and/or servicing of such equipment, all of which must be at the sole cost and expense of the Tenant.

The Tenant must furnish and install all curbs, supports, lintels, pipes, ducts, vent caps, air inlets, exhaust hoods, louvers, flashings, counterflashing, etc. as required for any equipment requiring openings through the roof and/or exterior walls. The use of curb adapters is not allowed. All unused roof penetrations must be removed and roof restored to original condition.

The Landlord has the right to inspect the quality of the work and approve locations and, if found unsatisfactory, reject same.

All cutting, patching and restoring of roofing is to be done by the Landlord's roofing contractor at the Tenant's expense. All repairs, maintenance and damage to the roof and/or building due to Tenant's installation must be at the Tenant's cost and expense.

All Tenant rooftop equipment and ductwork is to be properly screened per Landlord requirements. In addition, Tenant screening, equipment, ductwork and piping is to be painted to match the roof deck per Landlord specifications.

### Building Management System

If applicable, Tenant must connect to the Mall's existing Energy Management System. In the process of Tenant renovation, the system must be upgraded to meet current criteria at Tenant's expense. Tenant must contact Landlord's designated contractor for the purchase and installation of the necessary controls and connection to the main control panel.

Duct mounted smoke detectors if required by code, must be connected to the main fire alarm panel, if applicable. Each duct smoke detector must have a remote key operated reset/test device mounted within the Tenant space and an addressable relay module. Use Landlord's designated contractor for connection to the main fire alarm loop.

### Closeout Requirements

1. Tenant must submit as-built drawings and certified air balance reports prior to construction close out showing the exact location of all equipment and duct work.
2. Tenant is required to properly abandon old and unused roof top equipment (HVAC units, exhaust fans, etc.) by full removal, including curb with an appropriate metal deck and roof material patch. All roofing work must be performed by the Mall approved roofing contractor.
3. Pavers must be placed around the roof top equipment and from the main pathway to the equipment in order to protect the roof from traffic.
4. All Tenant equipment located on the roof or outside the demised premises must be permanently labeled with the Tenant name and space number.

## PLUMBING CRITERIA

### General Design/Construction Coordination

The following criteria is provided for the purpose of designing the Tenant's plumbing system. This criteria is provided for Tenant's Engineer. It is the Tenant's responsibility to verify existing conditions and comply with all applicable codes and standards.

Complete Engineered drawings must be submitted to Landlord's Tenant Coordinator for review and approval. Landlord will review the plans for conformance to basic Mall requirements. The Landlord does not review for plumbing design, nor does the Landlord accept responsibility for the Tenant's adherence to governing codes.

***The documents to be submitted for Landlord approval must include the following:***

Complete plans and specifications covering the complete plumbing system. Documents must be signed and sealed by a Licensed Engineer in the state where the Shopping Center is located.

The Tenant shall provide a complete plumbing system for the Tenant space. The Landlord has provided connections in each Tenant space for sanitary waste and potable cold water.

Tenant is responsible for all plumbing including toilets, sinks, urinals, drains, hot water heaters, water coolers and connections into existing water and sewer lines.

### Water Efficiency

1. The Tenant is required to install waterless urinals in tenant restrooms when urinals are used.
2. Low-Flow water closets using 1.6 GPF or less gallons per flush will be installed in all tenant spaces.
3. Operation sensors and low-flow heads using 0.5 GPM or less in lavatories.

Tenant shall provide a main water shut off valve located at eye level in a wall behind a labelled access door. Locate in or near employee restroom as designated by Landlord.

All domestic water supply lines shall be copper. Sanitary and vent lines traversing the ceiling area to be cast iron or copper (no PVC). Tenant will utilize electric water heaters for domestic hot water. All condensate lines shall be copper.

Every Tenant must install a handicapped restroom facility with a minimum of one water closet and one lavatory and in accordance with local code officials. An exception to this requirement is only permitted for Food Court Tenants who are within close proximity to the public restrooms upon approval of the Landlord and local code official.

All Tenant must install a floor drain in the toilet room and in all "wet" areas. Mop sinks and water fountains must be installed per local code requirements.

Tenant must install clean outs as required by code and Landlord's requirements and these shall terminate flush with the finish floor or wall. No clean outs are permitted above the ceiling.

Garbage disposals are not allowed.

Hair salons and pet shops shall provide hair and solids interceptors on all sinks and basins which may receive human or animal hair. After installation, these hair interceptors shall be properly maintained so as to keep the sanitary system free from any adverse conditions.

Except with Landlord's prior written permission for non-compliance, all pot sinks, scullery sinks, pre-wash sinks and other kitchen units must be connected to a grease trap. Dishwashers may not be connected to grease trap.

Waterproofing must be installed in all "wet areas" such as kitchens, restrooms, mop sinks, drinking fountains, etc. The waterproof membrane must extend 4" vertically on all demising walls. This membrane will be water tested by the General Contractor and inspected and signed off by Mall Personnel. If the membrane fails the water test, it must be replaced.

## PLUMBING CRITERIA (cont'd.)

Food service, hair salons or other Tenants with equipment or operations that have the possibility of backflow will be required to install an approved backflow preventer. These must be certified and acceptable to the water district and checked yearly or as required by the local authority having jurisdiction.

Tenants on the upper level must coordinate with lower level Tenants and the Landlord for floor penetrations and any plumbing under the upper level floor/deck. Tenant will be responsible for all cost associated with this work.

Tenants must submit calculations to the Landlord which show the size selection or basis of capacity of all equipment and piping.

### Gas Service

Gas may be available at the Center. Tenant, at its sole cost and expense and in compliance with local code must procure gas service to and within the demised premises and will make all necessary arrangements with the local Gas Company for such service. Tenant is responsible for installation of a gas meter at the gas meter header.

Pressure regulators and piping required for connection to Tenant's equipment is the responsibility of the Tenant. Coordinate with Landlord for regulator vent routing.

Gas piping on the roof must be placed on pillow blocks or similar arrangement. All piping supports are to be submitted separately to the Tenant Coordinator for approval by the Mall's roofing contractor.

### Ventilation

Tenants will provide vertical exhaust ducts at a location designated by Landlord. All hood exhaust must be connected to vertical duct in accordance with code. Tenants are required to provide for the upkeep and maintenance for such vertical exhaust duct and related devices and materials.

All sanitary sewer and plumbing vent piping shall comply with all local codes

### Water Meters

All Tenants shall install a water sub-meter.

Water meter shall a Multimag Cold Water Meter.

Please refer to criteria exhibit 9 for specific model numbers and specifications

## STRUCTURAL CRITERIA

The following criteria is provided for the purpose of designing the Tenant's structural drawings. This criteria is provided as a guideline for Tenant's Engineer. It is the Tenant's responsibility to verify existing conditions and comply with all applicable codes and standards.

Complete Engineered drawings must be submitted to the Landlord's Tenant Coordinator for review and approval. Landlord will review the plans for conformance to basic Mall requirements. The Landlord does not review for design, nor does the Landlord accept responsibility for the Tenant's adherence to governing codes.

***The documents to be submitted for Landlord approval must include the following:***

- Complete plans and specifications for all structural work. Documents must be signed and sealed by a Licensed Engineer in the state where the Shopping Center is located.

### General Requirements

1. The Tenant's storefront must be structurally self-supported. Tenant may not support the storefront from the bulkhead or fascia. Structural support for Tenant storefronts must be from the roof joists for lateral bracing.
2. Fixtures and equipment may not be attached to or supported from the floor or roof deck.
3. Structural drawings are required for all items that require support from the steel structure or for all roof top equipment weighing 300 lbs. or more.
4. Joist reinforcing is required for roof top equipment as well as steel support for all roof openings. Details of joist reinforcing are to be included in the Tenant plans submitted for Landlord review. Upper level Tenant's must review base building structural drawings prior to installing a security safe, ovens or any equipment weighing 300 lbs. or more.

## EXIT CORRIDORS

Distribution of utilities through a newly constructed or an altered exit passageway is prohibited except for equipment and ductwork specifically serving the exit passageway, sprinkler piping, standpipes, electrical raceway for fire department communication and electrical raceway serving the exit passageway.





1961 Chain Bridge Road, Suite 105 Tysons Corner, VA 22102

# EXHIBIT A AHU COMMISSIONING START-UP CHECKLIST

## HVAC SYSTEM AHU COMMISSIONING START-UP CHECKLIST

PROJECT : \_\_\_\_\_ Manufacturer: \_\_\_\_\_  
 Date: \_\_\_\_\_ Model #: \_\_\_\_\_  
 Attendees: \_\_\_\_\_ Serial #: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Pre-Start Inspection:**

|   | Checked (Yes/No) | Comments: |
|---|------------------|-----------|
| Mounting, isolators, Filters, Components            |                  |           |
| Plenums, Ducts and Coils Clean and Clear            |                  |           |
| Fire dampers tested                                 |                  |           |
| Alignment, Belt Tension, Lubrication                |                  |           |
| Fan(s) Rotates Freely                               |                  |           |
| All Dampers Open                                    |                  |           |
| Operation and Maintenance Manuals                   |                  |           |
| Verify Piping, Valves, Strainer, etc. configuration |                  |           |
| Drain Pan   |                  |           |
| Electric Heating Coil                               |                  |           |
| Outside Air, Return air and Mixed Air Dampers       |                  |           |
| Disconnect Switch                                   |                  |           |
| Overload Protection (Sized Correctly)               |                  |           |

**Mechanical Service Connections:**

|                              | Checked (Yes/No) | Comments: |
|------------------------------|------------------|-----------|
| Valves installed             |                  |           |
| Condensate drains clear      |                  |           |
| Duct Systems Complete /Clean |                  |           |
| Misc. Components             |                  |           |

**Electrical Service Connections:**

|                                      | Checked (Yes/No) | Comments: |
|--------------------------------------|------------------|-----------|
| Electrical Connections Completed     |                  |           |
| Control System Operational           |                  |           |
| Ready to Start and Run Under Control |                  |           |
| Misc. Components                     |                  |           |

## HVAC SYSTEM AHU COMMISSIONING START-UP CHECKLIST

**Start-Up Inspection:**

|   | Checked (Yes/No) | Comments: |
|---|------------------|-----------|
| Manufacturer's Representative Present     |                  |           |
| Mech, Elec. & Controls Contractor Present |                  |           |
| Fan Rotation Correct                      |                  |           |
| Electrical Interlocks (Start/Stop)        |                  |           |
| Freeze Protection Operational             |                  |           |
| Vibration/Noise Acceptable                |                  |           |
| Motor Amps (Rated/Actual)                 |                  |           |
| Motor Volts (Rated/Actual)                |                  |           |
| Heater Amps (Rated/Actual)                |                  |           |
| Heater Volts (Rated/Actual)               |                  |           |
| Final Clean Filters Installed             |                  |           |
| Misc. Items                               |                  |           |

**Sequence of operation inspection:**

|                                       | Checked (Yes/No) | Comments: |
|---------------------------------------|------------------|-----------|
| Are controls visible on BMS           |                  |           |
| Cooling Operation (occupied)          |                  |           |
| Night Set Back Operation (Unoccupied) |                  |           |
| Economizer operation                  |                  |           |
| Heating operation                     |                  |           |
| Misc. Items                           |                  |           |

Pre-Start Check (Name): \_\_\_\_\_ Date: \_\_\_\_\_ Company: \_\_\_\_\_

Start-Up Check (Name): \_\_\_\_\_ Date: \_\_\_\_\_ Company: \_\_\_\_\_

Mall Sign off (Name): \_\_\_\_\_ Date: \_\_\_\_\_ Company: \_\_\_\_\_

**The following are required by contractor prior to final install vendor contract payment:**

1. Certified manufacturer's start-up and test reports for the new HVAC.
2. Certified air and water balance test reports. (Must be NEBB Certified).
3. Bound O&M Manuals for the new HVAC units outlining maintenance procedures, parts lists, etc. and hard copies of approved shop drawing submittals by the Design and Landlord Engineer.
4. New HVAC units warranty paperwork.

EXHIBIT B - BELIMO SINGLE LINE DIAGRAM

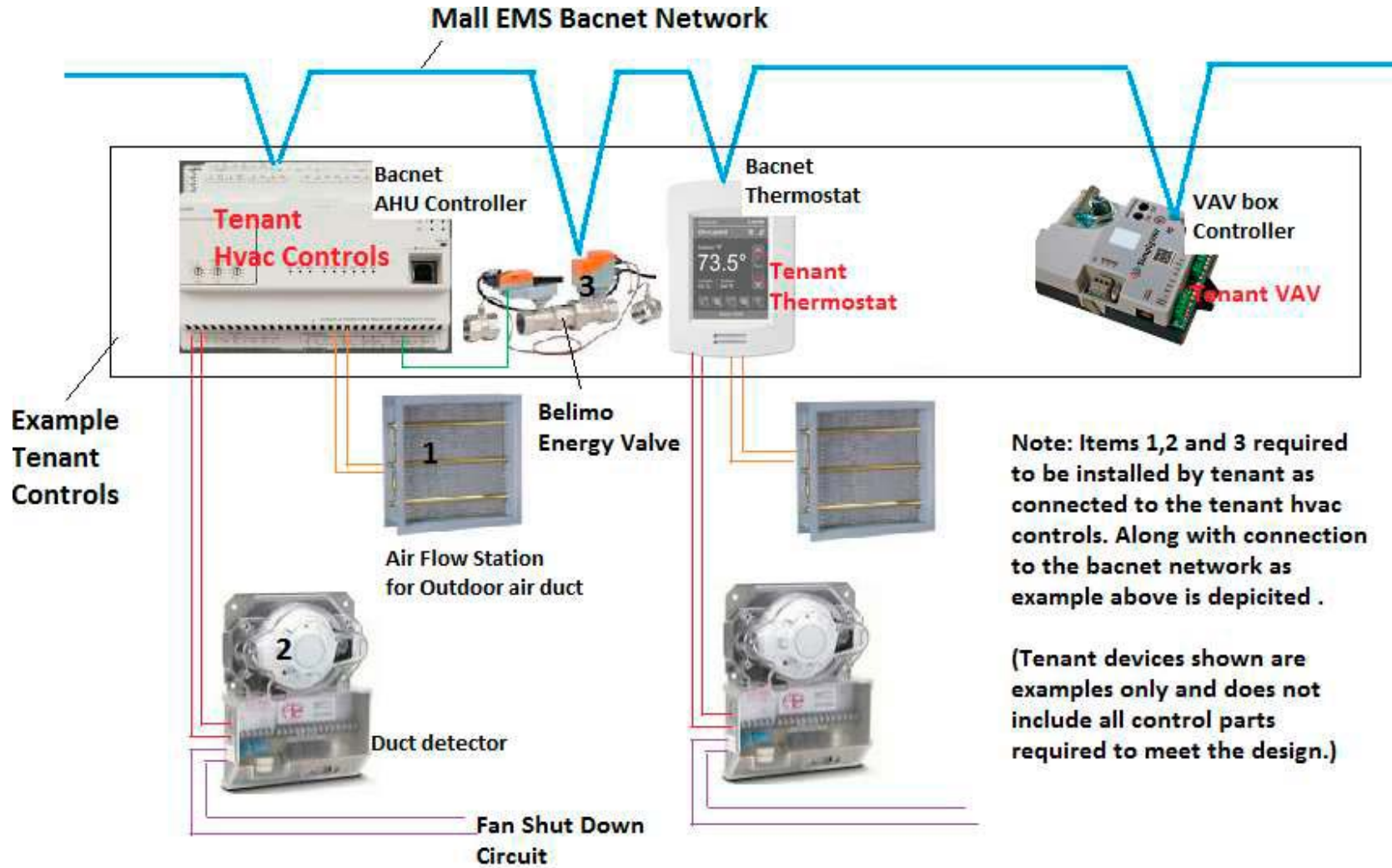


EXHIBIT C - BELIMO ENERGY VALVE

Belimo Energy Valve™  
Solving Low Delta-T



> Learn more  
[www.energyvalve.com](http://www.energyvalve.com)



Measures Energy

Controls Power

Manages Delta T

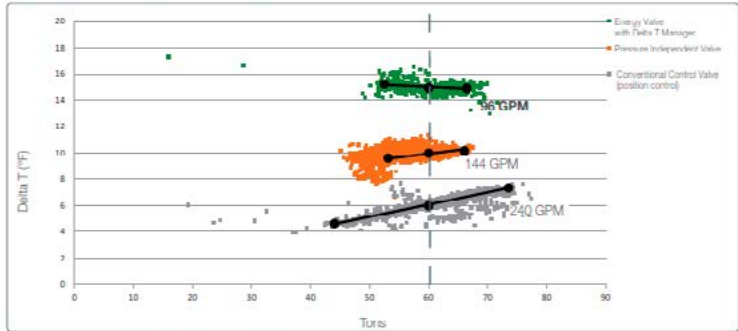
One Optimized Complete Solution.

The Energy Valve is a pressure independent valve that measures and manages coil energy by using an embedded electromagnetic or ultrasonic flow meter, along with supply and return water temperature sensors. The Energy Valve also has the patented Power Control and Belimo Delta T Manager™ logics built-in that monitors coil performance and optimizes the available energy of the coil by maintaining the Delta T. In addition to the standard analog signal and feedback wiring, it communicates its data to the Building Management System via DACnet MS/TP or DACnet IP. The built-in web server collects up to 13 months of data that can be downloaded to external tools for further analysis. Some of these features contribute to LEED points.

- Measures Energy** Integrated energy meter provides accurate coil performance data. The data is used to verify system performance during commissioning and act as a baseline standard for system performance over time. This feature helps achieve LEED points through Energy and Atmosphere within credits 1 and 5.
- Controls Power** Built-in power control logic provides linear control of coil heat transfer adapting to system changes. This mode allows for quick and precise reaction to all system variables.
- Manages Delta T** Belimo Delta T Manager algorithm reduces pumping and chiller/boiler operating costs by increasing chiller plant efficiency and eliminating waste zone operation.

The Delta T Manager maintains temperature differential based on a customer defined setpoint by regulating the flow using the delta T measurement across the coil.

Operating Mode Comparison Example



Coil performance to achieve 60 tons of cooling:

- Conventional control valve (position control) uses 240 GPM with a 6°F Delta T.
- Flow control with Delta T Manager uses only 96 GPM with a 15°F Delta T.

A conventional control valve uses 2.5 times more the amount of water than the Energy Valve with Delta T Manager to serve the same load!

EXPERIENCE EFFICIENCY



## EXHIBIT C - BELIMO ENERGY VALVE (cont'd)

### Most Capable Valve in the HVAC Industry.


#### Pressure Independent Valve Comparison

| Features                  | Typical PI*   | ePIV | Energy Valve |
|---------------------------|---------------|------|--------------|
| True Flow                 |               | •    | •            |
| Dynamic Balancing         | •             | •    | •            |
| Energy Meter              |               |      | •            |
| Power Control             |               |      | •            |
| Delta T Manager           |               |      | •            |
| Live Data                 |               | •    | •            |
| Coil History (13 Months)  |               |      | •            |
| CCV Technology**          |               | •    | •            |
| Leakage**                 | ANSI Class IV | 0%   | 0%           |
| High Close-off            |               | •    | •            |
| Low Minimum Pressure Drop |               | •    | •            |
| Field Configuration       |               | •    | •            |
| BACnet MS/TP or IP        |               |      | •            |
| 5-Year Warranty           |               | •    | •            |

The Energy Valve provides the same reliable, automatic, pressure independent flow control you've come to expect, and offers so much more. Never before has one valve done so much – measures energy, controls power, manages delta T, communicates, trends, and diagnoses.

[www.EnergyValve.com](http://www.EnergyValve.com)

\*Typical Pressure Independent valves based on globe valve technology  
 \*\* Not available on ANSI 250 models.

| Product Range   | Valve            |                       |                    | Actuator Type     |                      |
|---|------------------|-----------------------|--------------------|-------------------|----------------------|
|   | End Fittings     | Design Flow Range GPM | Valve Nominal Size | Non-Spring Return | Electronic Fail-Safe |
|   | NPT              | 1.65 - 100            | 1/2" - 2"          | •                 | •                    |
|  | Flanged ANSI 125 | 38 - 713              | 2 1/2" - 6"        | •                 | •                    |
|  | Flanged ANSI 250 | 38 - 713              | 2 1/2" - 6"        | •                 | •                    |

The Energy Valve is based on Belimo patent and patent pending technologies.  
 • US Patent #: 8,039,354: Ball valve with modified characteristics.  
 • US Patent Pending: 2011/015,269: HVAC actuator comprising a network interface, data store and a processor.  
 • US Patent Pending: 2009/009,915: Control of sensor bias and hysteresis DC-Motor  
 Powered by Optimum Energy™

BACnet is a registered trademark of ASHRAE. ASHRAE does not endorse or test products for compliance with ASHRAE standards. Compliance of listed products to requirements of ASHRAE Standard 135 is the responsibility of the BACnet International. BIL is a registered trademark of the BACnet International.

### One solution, so many benefits!

#### Belimo Energy Valve:

- **Energy Meter** measures energy usage, flow and differential temperature across the coil which creates load transparency.
- **Power Control** allows you to set your power output to a specific value in a linear response. Coil and valve characteristics become irrelevant. Coil control is now both pressure and temperature independent.
- **Delta T Manager™** continuously monitors the coil delta T and compares it to the desired delta T setpoint. If the actual delta T is below the setpoint, the valve will readjust flow to bring delta T back to the desired setpoint.
- **True Flow** is achieved with the built-in electronic flow meter which can be shared with the DDC system. Flow verification is simple and troubleshooting is fast.
- **Dynamic Balancing** provides pressure independent operation by maintaining constant flow regardless of pressure differential fluctuations.
- **Coil Data (13 Months)** is stored to provide ongoing commissioning. This valuable data give a level of operation transparency that was never previously available.
- **Characterized Control Valve™** technology improves light load control, provides self-cleaning, higher close-off, and zero leakage eliminating "ghost energy" losses in the system.
- **BACnet** communication provides the ability to read values and write settings through a BACnet IP or BACnet MS/TP network.

\* Not available on ANSI 250 models.



[www.EnergyValve.com](http://www.EnergyValve.com)

Belimo Americas

USA, Latin America, and the Caribbean: [www.belimo.us](http://www.belimo.us)

Canada: [www.belimo.ca](http://www.belimo.ca)

Brazil: [www.belimo.br](http://www.belimo.br)

Belimo Worldwide: [www.belimo.com](http://www.belimo.com)

