



# ENERGY MANAGEMENT OPERATIONAL CHECKLIST

YORK CHAN, CHFM  
Advocate Health Care  
Oak Brook, IL

CHILLER PLANT AND AIR CONDITIONING						
	ENERGY CONSERVATION MEASURES	LOCATION	YES	NO	PART	COMMENTS
1	Cycle chill water on return temperature and reset temperature by wet bulb.					
2	Utilize chiller load management program to stage chiller operations based on optimal efficiency					
3	Brush condenser tubing and check water flow through bundles. Monitor temperature gains/drops through bundle.					
4	Convert primary chilled water loop to variable pumping based on differential pressure utilizing variable frequency drives and two way valves instead of three way valves					
5	Adjust controls to stage compressors on a multiple stage system. Should automatic controls not exist, purchase and install. This will allow compressor #2 to cut in when compressor #1 can no longer satisfy space conditioning load					
6	Clean condenser on air cooled systems Condensers are maintained on a scheduled basis.					
7	Chiller evaporating and condensing temperatures are not optimized. Decrease chiller condensing temperature following manufacturer's recommendations					
8	If system is forced air, using DX coils and air cooled condenser, install economizer cycle to obtain free cooling					
9	Clean Scale build-up in condenser on water cooled systems					
10	Clean evaporator coil, fins and tubes					
11	Repair joint or piping leaks in chilled water system					
12	Raise chilled water supply temperature. (NOTE: This is especially important if system was designed for a 75°F space temperature and the space setting has been raised to 78°F for energy conservation purposes.)					

COOLING TOWERS						
	ENERGY CONSERVATION MEASURES	LOCATION	YES	NO	PART	COMMENTS
1	Reset water temperature set point based on wet bulb temperature					
2	Clean and flush tower(s) before seasonal start up and whenever needed during cooling season					
3	Perform daily chemical testing of water in cooling towers					
4	Minimize water blow down by controlling solids to the highest cycle of concentration					

AIR HANDLERS						
	ENERGY CONSERVATION MEASURES	LOCATION	YES	NO	PART	COMMENTS
1	Convert to variable air volume system if the reheat coils are not necessary to supply heat during the heating season					
2	Reset discharge air temperatures based on return air temperatures					
3	Minimize the usage of reheats and hot deck systems					
4	Reset thermostats in common areas for seasonal changes - e.g.: 75 degrees for Summer and 71 degrees for Winter					
5	Install time clocks to cycle air handler(s) and exhaust fan(s) off during non-occupied periods					
6	Utilize manometric gauges, manometers or differential pressure sensors to monitor pressure drops across air filters					
7	Ensure that coils are maintained and cleaned to reduce fan horsepower to overcome resistance caused by plugged coils					
8	Monitor and balance flow through cooling and heating coils for proper temperature gains or drops - $\Delta T$					
9	Ensure that dampers and damper operators are functioning properly					
10	Adjust damper linkage					
11	Readjust position indicators to accurately indicate damper positions					
12	Adjust fan belt(s) tension to reduce deflection and slippage					
13	Make sure that air intake volume is not excessive while maintaining minimum requirements					
14	Reduce outdoor air quantity to the minimum allowed by codes by adjusting outdoor air dampers during hours of occupancy					
15	Install time clocks or on-demand sensors to cycle kitchen exhaust hoods					
16	Install time clocks on laboratory exhaust/fume hoods when not in use					

BOILERS/HEATING						
	ENERGY CONSERVATION MEASURES	LOCATION	YES	NO	PART	COMMENTS
1	Reduce steam pressure for summer operation and reset to higher pressure for winter operation. Example: summer 72 psi and winter 90 psi.					
2	Account for all condensate return water. It takes less energy and chemical usage making steam with 180 degree condensate instead of 40 degree city water make up					
3	Pipe high pressure flash tank vent(s) to reclaim steam into supply side					

<b>BOILERS/HEATING (continued)</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
4	Monitor and maintain chemical treatment for boilers. This is crucial for proper boiler operations and heat exchange.					
5	Maintain the deaerator water supply to 215 degrees for boiler feedwater					
6	Install burner management system utilizing stack temperature analysis to adjust fuel/air settings					
7	Test boiler combustion efficiency on a scheduled basis					
8	Perform flue gas analysis on a regular basis to ensure proper air to fuel ratio					
9	Purchase and install automatic staging controls, if applicable					
10	Adjust controls so that boiler #2 will not fire until boiler #1 can no longer satisfy the demand					
11	Ensure that proper amount of air for combustion is available in furnace room					
12	Stack temperature appears excessively high (greater than 400°F plus room temperature					
13	Examine and clean air intake filters					
14	Check the temperature of the pipe on the downstream side of steam traps. If it is excessively hot, the trap probably is passing steam. This can be caused by dirt in the trap, a valve off the stem, excessive steam pressure, or worn trap parts (especially valves and seats). If the pipe is moderately hot (as hot as a hot water pipe), it probably is passing condensate, which it should do. If it's cold, the trap is not working at all, and should be replaced or repaired. Initiate a steam trap maintenance program					
15	If thermostatic trap is malfunctioning, clean or replace bellows element					
16	Clean or replace thermostatic control valves on radiators					
17	Check air vent valve. If not operating properly, replace					
18	Water pockets may be obstructing steam flow. Correct by re-pitching or rerouting pipes					
19	Inspect pipes for broken or missing insulation. Repair or replace as needed					
20	Install additional pipe insulation in accordance with design specifications and energy conservation codes					
21	Remove scale deposits, accumulation of sediment and boiler compounds on water side surfaces. Examine and treat rear portion of boiler (the area most susceptible to scale formation)					
22	Remove soot from tubes					

<b>BOILERS/HEATING (continued)</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
23	Observe the fire when the unit shuts down. If the fire does not cut off immediately, it could indicate a faulty solenoid valve. Repair or replace as necessary					
24	Inspect all boiler insulation, refractory, brick work and boiler casing for hot spots and air leaks. Repair and seal as necessary					
25	Burner short-cycles. Start-stop limit switches may be set too closely. Reset as required.					
26	Utilize heat from flue gas to preheat combustion air by means of a heat recovery device					
27	Consider economizer to transfer heat form flue gas to feed water.					
28	Consider heat recovery from continuous blowdown					
29	Hot water pump or booster pump may not be functioning. Repair or replace as necessary					
30	Bleed air from radiators, convectors, baseboards and finned-tube heaters					

<b>DOMESTIC WATER PLUMBING SYSTEMS</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
1	Add timer(s) to recirculating pumps. Turn off when building is unoccupied					
	Lower hot water temperature based on occupancy. Schedule setbacks (either manually or with existing time clock).					
2	Install variable frequency drive to house pumps and remove flow control devices					
3	Install low volume urinals 1/8 gallon per flush					
4	Install dual flush toilets (less water for liquid waste, more water for solid waste)					
5	Install low flow faucets with infrared sensors					
6	Repair all leaks including those of the faucets and pumps					

<b>LIGHTING</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
1	Install occupancy sensors with light sensitivity in common areas					
2	Install photocell sensors in areas that have windows to turn off lights and utilize sunlight					
3	Install timers to turn off lights when space is unoccupied					
4	Retrofit with more efficient lighting wherever possible T-12 to T-8, T-5					
5	Retrofit with more efficient lighting wherever possible - Incandescent to Compact Fluorescent					

<b>LIGHTING (continued)</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
6	Retrofit with more efficient lighting wherever possible - High Pressure Sodium and Mercury Vapor to Compact Fluorescent or LED					
7	Replace incandescent "EXIT" signs with LED signs					
8	Retrofit incandescent "EXIT" signs with LED lamps					
9	Establish a regular inspection and cleaning schedule for lamps and luminaires (fixtures). Dust buildup reduces effectiveness					
10	Replace lens shielding that has turned yellow or hazy with new acrylic lenses which do not discolor					
11	Replace outdated or damaged luminaires with modern typed that are easy to clean					
12	Establish a group re-lamping schedule to minimize single lamp replacements.					
13	Clean ceiling and wall surfaces for good reflectance					
14	Clean windows and skylights					
15	Disconnect ballasts, which still use significant amount of energy even though tubes have been removed					
16	Consider not replacing burned out bulbs or lamps, and disconnecting ballasts in areas where delamping is possible. For example, in four-lamp fixtures allow two lamps to remain, disconnecting appropriate ballasts.					
17	Replace burned out lamps with lower wattage lamps.					

<b>HVAC CONTROLS</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
1	Control devices and sensors are inspected and calibrated on a regular basis					
2	Overrides are not allowed on Building Automation System except on a temporary basis					
3	Change the location of thermostats from areas subject to extreme temperature fluctuations, such as next to window, or over a heating or cooling unit					
4	Utilize building automation system to control all spaces in accordance with usage					
5	Reset thermostats to correct settings					
6	Install or replace locking covers on thermostats to prevent tampering					
7	Install pre-set solid-state electronic thermostats if existing controls are electric					

<b>HVAC CONTROLS (continued)</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
8	Relocate thermostats in return air ducts where they will be inaccessible to occupants					
9	Blow out moisture, oil and dirt from pneumatic lines (for pneumatic systems); clean contacts if electrical control system.					
10	Recalibrate controllers					
11	Ensure that control valves and dampers are modulated properly					
12	Adjusted thermostats to 68°F in heating season and to 78°F during cooling season					
13	For electric control system, install pre-set solid-state thermostats which do not require calibration					
14	Routinely check all time clocks and other control equipment for proper operation, correct time and day and for night and proper programming of on-off set points. Protect from unauthorized adjustment					
15	For unoccupied area, Reduce thermostat settings by a minimum of 10°F at nights, weekends and holidays during heating season, but maintain ventilation.					
16	Reduce winter thermostat settings to 55°F in unoccupied areas					
17	Where possible, turn off heating systems if nothing in space can freeze					
18	Use spot heaters/coolers in large spaces with low occupancy					
19	Increase summer thermostat setting, in unoccupied areas, if possible					
20	Heating/cooling equipment is started before occupants arrive and/or is operating during last hour of occupancy					
21	Properly adjust and balance air/water systems and controls					

<b>BUILDING ENVELOPE</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
1	Realign or re-hang windows or doors that do not close properly. In extreme cases, consider permanent sealing of windows					
2	Ensure that automatic door closing mechanisms work properly					
3	Replace or repair faulty gaskets in garage or on other overhead doors					
4	Install self-closing doors on openings to unconditioned spaces					
5	Assure that automatic door closers function properly					
6	Install vestibule doors at major entrances					

<b>BUILDING ENVELOPE (continued)</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
7	Replace worn and/or broken weather-stripping and caulking					
8	Replace broken or cracked windows to minimize air leakage.					
9	Where practical, cover all windows and through the wall cooling units when not in use. Specially designed covers can be obtained at relatively low cost					
10	In areas with constant strong winds, install wind screens to protect exterior doors from direct blast of prevailing winds					
11	Install double or triple paned windows					
12	Add reflective or heat absorbing film to minimize solar gain in summer and heat loss in winter					
13	Install adjustable outdoor shading devices					
14	Attach storm glazing to moveable sash of operable windows					
15	Ceiling/roof insulation is inadequate or has been water damaged					
16	Add new insulation to meet recommended standard. (check the cost effectiveness of this measure particularly if your facility is over three stories.)					
17	Use blinds and curtains to help insulate the building. Instruct personnel to close interior shading devices to reduce night heat loss in winter and to reduce solar heat gain during the summer.					
18	Repair or replace damaged or missing shading devices					
19	Install outdoor shading devices where applicable					

<b>VENTILATION</b>						
	<b>ENERGY CONSERVATION MEASURES</b>	<b>LOCATION</b>	<b>YES</b>	<b>NO</b>	<b>PART</b>	<b>COMMENTS</b>
1	Check ductwork for any obstructions such as loose hanging insulation (in lined ducts), loose turning vanes and accessories, and closed volume and fire dampers. Adjust, repair or replace as necessary.					
2	Inspect all room air outlets and inlets (diffusers, registers and grilles). They should be kept clean and free of all dirt and obstructions. Clean and remove obstructions as necessary.					
3	Clean or replace dirty or ineffective filters on a regular basis					
4	Large spaces having low occupancy are maintained at comfort conditions. Reduce overall ventilation in space.					
5	Repair any malfunctioning ventilation equipment					

VENTILATION (continued)						
	ENERGY CONSERVATION MEASURES	LOCATION	YES	NO	PART	COMMENTS
6	Replace old style dampers with new high quality opposed-blade models with minimal leakage.					
7	Close outdoor air dampers when building is unoccupied. Be sure dampers have proper seals and adjust to ensure complete closure					
8	Whenever possible, use outside air for cooling rather than using refrigeration					
9	Install an economizer cycle with enthalpy control to optimize use of outside air for cooling					
10	Discontinue use of unnecessary exhaust fans					
11	Re-wire restrooms' exhaust fans to operate only when lights are on					
12	Establish schedules so that exhaust fans run only when needed					
13	Group smoking and other areas with similar exhaust requirements so that they may be served by one exhaust system. Reduce ventilation in remaining non-contaminated areas					
14	Install time clocks or other controls to shutoff exhaust system when not needed (when permitted by code)					
15	Install a rheostat in series with exhaust fan to modulate fan speed so that no more than the necessary amount of air will be exhausted					
16	Install chemical or electronic odor or particulate remover to reduce the need for using outside air for ventilation					
17	Install controlled or gravity dampers on all exhaust ducts to close ducts when fan is not operating					
18	Repair damaged or missing pipe and duct insulation					
19	Repair leaks in ductwork and piping					
20	Clean air inlet and outlet diffusers and grills					
21	Inspect fire/smoke dampers, turning vanes, sound attenuators. Clean and/or repair as necessary.					