Functional Performance Test

Air-Side Economizer

Date:_____

Building Name: _____ Testing Agent:_____
Address: _____ _____
_____ Assisted by:_____
Phone: _____ _____

Equipment Name: _____
Manufacturer: _____

ECM No._____ ECM Name: _____ New/Retrofit:_____

Unit ID	AHU ID	Size (tons)	Zone
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____

Documentation. Installation and user's manuals on site (Y / N)?_____

Installation. Note any anomalies about the installations.

_____

_____

Space and OSA temperature sensors have been calibrated *and* OSA sensor located in open air, shaded, but not enclosed (where there may be heat buildup from the sun). (Y / N)?_____

Control Sequence Tests.	**Unit 1**	**Unit 2**	**Unit 3**	**Unit 4**
General Information				
1. What is current space temperature setpoint? Cooling:	_____	_____	_____	_____
(enter: occupied / unoccupied) Heating:	_____	_____	_____	_____
2. Economizer Characteristics:				
Sensor type: DB = dry bulb, dH = enthalpy	_____	_____	_____	_____
Integrated: (Y / N)	_____	_____	_____	_____
Controls: **PK** = packaged only, **EMS** = all control by EMS, **PK+** = settings by package; enabled by EMS:	_____	_____	_____	_____

Dampers: How many positions is the damper system capable of, including when OFF (step positions: closed,minimum and full open)? Enter two, three or infinite. _____ _____ _____ _____

	Unit 1	Unit 2	Unit 3	Unit 4
3. What type of building pressure relief is there? (**FL** = fixed link to OSA damper, **BD** = barometric RA damper, **EF** = exhaust fan)	_____	_____	_____	_____
4. What are the current economizer setpoints (changeover temperatures)?				
(If OSA is below this, econ. will open) Package setting:	_____	_____	_____	_____
(PK+ types will have both settings) EMS enable pt.:	_____	_____	_____	_____

Mode 1. Test Damper Position in AHU OFF Status

1. Turn unit OFF.

2. Are dampers completely shut?	OSA:	_____	_____	_____	_____
	Relief:	_____	_____	_____	_____
3. Is return damper at maximum open?		_____	_____	_____	_____
Does the system comply in this mode?		_____	_____	_____	_____

Mode 2. Test Damper Position With AHU in ON Status; Compressor (or coil valve) and Econ. OFF

1. Turn cooling setpoint to 85F.
2. Turn heating setpoint to 60F.
3. Turn unit ON.

4. Are dampers at a minimum?	OSA:	_____	_____	_____	_____
	Relief:	_____	_____	_____	_____
5. Is return air damper at maximum open?		_____	_____	_____	_____
6. NO in either of the above two questions denotes noncompliance. *Does the system comply in this mode?*		_____	_____	_____	_____

Mode 3. Test Dampers in First Stage of Cooling (Econ. ON, Compressor or coil valve ON or OFF)

1. Adjust economizer setpoint or EMS OSA temperature values so economizer will turn on if cooling is called for.
   For **DB economizers,** OSA temp. must be, or be simulated to read by keyboard edit in EMS, below the economizer setpoint and above any DA low limit (usually ~55°F if used). If OSA is too hot or too cold and there is no EMS system, use a wet rag or hair blower on OSA sensor **OR** come back at a time when OSA is appropriate, **OR** use jumper method of testing, **OR** use "canned" automatic testing sequence in unit, if any. The last two methods give only a partial assurrance that the economizer is functioning. For **enthalpy type economizers**, locate the enthalpy of the space air and the OSA on a psychometric chart. Simulate conditions for either so that the OSA has less enthalpy than the inside air or use alternate methods above.

Describe method used:

		Unit 1	Unit 2	Unit 3	Unit 4
2. Adjust cooling setpoint or space temp. until setpoint is 1°F *below* space temp. for integrated economizers (deadband + 1° for integrated types).	Record:				
3. Cooling set point:		_____	_____	_____	_____
4. OSA temperatures (actual or simulated, circle):	DB:	_____	_____	_____	_____
(for enthalpy types)	Wet bulb:	_____	_____	_____	_____
5. Space temperature (actual or simulated, circle):	DB:	_____	_____	_____	_____
(for enthalpy types)	Wet bulb:	_____	_____	_____	_____
6. Do dampers open properly?					
(*Full open for dry bulb econ., partial for enthalpy type.* If	OSA:	_____	_____	_____	_____
OSA is below a functioning DA low limit, OSA damper	Relief:	_____	_____	_____	_____
will not be full open. Integrated economizers may not open full or at all in cold weather)					
7. Is return air damper closing proportionately?		_____	_____	_____	_____
8. Any NO answers in the above two questions denote noncompliance. *Does the system comply in this mode?*		_____	_____	_____	_____

Mode 4. Test if Economizer Is Integrated (Economizer ON, Compressor (or coil valve ON)

		Unit 1	Unit 2	Unit 3	Unit 4
1. Continuing from Mode 3, did compressor come on? (It is best if it doesn't)		_____	_____	_____	_____
2. If compressor does not come on, lower cooling setpoint 2° at a time (or raise space temp.) until compressor comes on. (circle action taken)					
3. What is the temp. of the changed parameter?		_____	_____	_____	_____
4. Do dampers stay open *and not* at min.?	OSA:	_____	_____	_____	_____
(If Yes, its integrated)	Relief:	_____	_____	_____	_____
Is RA proportionately *closed?*	RA:	_____	_____	_____	_____
5. Any NO answers in the last question denote noncompliance. *Does the system comply in this mode?*		_____	_____	_____	_____

Mode 5. Test if Dampers Go to Minimum When OSA is Above Economizer Setpoint

1. Return economizer settings to original, if changed.
2. For DB type, lower econ. setpoint or heat up OSA sensor, or simulate OSA in EMS, until the OSA is 1°F above the economizer setpoint or changeover temperature. For enthalpy types, change conditions so that the space enthalpy on the psychometric chart is *lower* than the OSA enthalpy. If dampers don't close, increase OSA temp. until they do.

		Unit 1	Unit 2	Unit 3	Unit 4
3. Do dampers close to minimum?	OSA:	_____	_____	_____	_____
	Relief:	_____	_____	_____	_____
4. Does the RA damper open to maximum?		_____	_____	_____	_____
5. What are the OSA temperatures being used to cause damper closure (this may be a real or simulated value)?	DB:	_____	_____	_____	_____
(for enthalpy types)	Wet bulb:	_____	_____	_____	_____
6. Is the OSA DB temperature being used, within 2° of what the economizer setpoint said it should be? (use psychometric chart and manufacture's specs for enthalpy types)		_____	_____	_____	_____
7. For DB types, is this OSA temperature between 2-5°F below space temp. setpoint? (the economizer should be set so it will open only *below* an OSA temp. of between 2-5°F below space setpoint)		_____	_____	_____	_____
8. Any NO answers in the above five questions denote noncompliance. *Does the system comply in this mode?*		_____	_____	_____	_____

Mode 6. Test if Dampers Go to Min. When Mixed Air Temp. (MAT) is Below Min. Setting

		Unit 1	Unit 2	Unit 3	Unit 4
1. Cool down MAT sensor, or simulate MAT in EMS, until it is below the MAT setting. (~45-55°F)					
2. Do dampers close to minimum?	OSA:	_____	_____	_____	_____
	Relief:	_____	_____	_____	_____
3. Does the RA damper open full?		_____	_____	_____	_____
4. What is the MAT temperature being used to cause damper closure (this may be a real or an EMS simulated value)?		_____	_____	_____	_____
5. Is the MAT temperature being used within 2° of what the specs say the setpoint temperature should be?		_____	_____	_____	_____
6. Any NO answers in the above three denote noncompliance. *Does the system comply in this mode?*		_____	_____	_____	_____

Restore all adjustments to their original settings, unless desired as a permanent change. Make a permanent mark on any economizer local controllers showing where the appropriate setting should be. Y / N _____

Abbreviations: SA = supply air, RA = return air, DA = discharge air, OSA = outside air, EMS = energy management system