

**APPENDIX A**

**CITY OF HOUSTON**

**NORTHWEST WWTP IMPROVEMENTS**

**PROJECT NO. 14050054**

**MECHANICAL ENGINEER OF RECORD**

**JACK L. BRITTON P. E.**

**TEXAS LICENSE NUMBER 113894**

**PARSONS CORPORATION**

**2200 WEST LOOP SOUTH, SUITE 200**

**HOUSTON, TX 77027**

**CITY OF HOUSTON**  
**NORTHWEST WWTP IMPROVEMENTS**  
**PROJECT NO. 14050054**  
**RESPONSES TO HVAC CODE QUESTIONS**

1. Submitting copy of COMcheck document in response to comment no. 1.
2. Submitting copy of outside air calculations based on Table 4-1 and Sec. 408.2 2006 Houston-UMC.
3. Resubmitting drawings with electric operated dampers on exhaust and outside air ducts for AHU-2 and gravity operated draft dampers for AHU-1 and AHU-3 in compliance with Section 503.2.4.4 Houston Amendment Sect. 502.2009 IECC.
4. Submitting copy of makeup air and air balance table for rooms 122 thru 129 with exhaust system capacity of 1545 cfm.
5. Submitting drawings with engineering firm's name and registration number of each mechanical sheet per Engineering Practice Act.



COMcheck Software Version 3.9.3

# Mechanical Compliance Certificate

2009 IECC

## Section 1: Project Information

Project Type: **Alteration**

Project Title : Northwest WWTP Improvements

Construction Site:  
5422 Randon Road  
Houston, TX 77091

Owner/Agent:  
City of Houston  
5423 Mangum Road  
Houston, TX 77098

Designer/Contractor:  
Robert Thornber, P.E.  
Parsons Corporation  
2200 West Loop South, Suite 200  
Houston, TX 77027  
713-871-7000  
bob.thornber@parsons.com

## Section 2: General Information

Building Location (for weather data): **Houston, Texas**  
Climate Zone: **2a**

## Section 3: Mechanical Systems List

### Quantity System Type & Description

- 1 HVAC System 1 (Single Zone) : Split System Heat Pump  
Heating Mode: Capacity = 34 kBtu/h,  
Proposed Efficiency = 3.30 COP, Required Efficiency = 3.30 COP  
Cooling Mode: Capacity = 81 kBtu/h,  
Proposed Efficiency = 11.00 EER, Required Efficiency = 11.00 EER  
Fan System: FAN SYSTEM 1 | Admin Bldg 1st Floor -- Compliance (Motor nameplate HP method) : Passes  
  
Fans:  
FAN 1 Supply, Constant Volume, 1150 CFM, 0.8 motor nameplate hp
- 1 HVAC System 2 (Single Zone) : Split System Heat Pump  
Heating Mode: Capacity = 89 kBtu/h,  
Proposed Efficiency = 3.20 COP, Required Efficiency = 3.20 COP  
Cooling Mode: Capacity = 188 kBtu/h,  
Proposed Efficiency = 10.60 EER, Required Efficiency = 10.60 EER  
Fan System: FAN SYSTEM 2 | Maintenance Bldg -- Compliance (Motor nameplate HP method) : Passes  
  
Fans:  
FAN 8 Supply, Constant Volume, 4800 CFM, 5.0 motor nameplate hp
- 1 HVAC System 3 (Single Zone) : Single Package Heat Pump  
Heating Mode: Capacity = 40 kBtu/h,  
Proposed Efficiency = 3.30 COP, Required Efficiency = 3.30 COP  
Cooling Mode: Capacity = 81 kBtu/h,  
Proposed Efficiency = 11.00 EER, Required Efficiency = 11.00 EER  
Fan System: FAN SYSTEM 3 | Admin Bldg 2nd Floor -- Compliance (Motor nameplate HP method) : Passes  
  
Fans:  
FAN 9 Supply, Constant Volume, 2470 CFM, 1.5 motor nameplate hp

## Section 4: Requirements Checklist

### Requirements Specific To: HVAC System 1 :

1. Equipment minimum efficiency: Heat Pump: 3.30 COP 11.00 EER

**Requirements Specific To: HVAC System 2 :**

1. Equipment minimum efficiency: Heat Pump: 3.20 COP 10.60 EER

**Requirements Specific To: HVAC System 3 :**

1. Equipment minimum efficiency: Heat Pump: 3.30 COP 11.00 EER

**Generic Requirements: Must be met by all systems to which the requirement is applicable:**

1. Plant equipment and system capacity no greater than needed to meet loads  
*Exception(s):*
- Standby equipment automatically off when primary system is operating
  - Multiple units controlled to sequence operation as a function of load
2. Minimum one temperature control device per system
3. Minimum one humidity control device per installed humidification/dehumidification system
4. Load calculations per ASHRAE/ACCA Standard 183.
5. Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup  
*Exception(s):*
- Continuously operating zones
6. Outside-air source for ventilation; system capable of reducing OSA to required minimum
7. R-5 supply and return air duct insulation in unconditioned spaces  
R-8 supply and return air duct insulation outside the building  
R-8 insulation between ducts and the building exterior when ducts are part of a building assembly  
*Exception(s):*
- Ducts located within equipment
  - Ducts with interior and exterior temperature difference not exceeding 15°F.
8. Mechanical fasteners and sealants used to connect ducts and air distribution equipment
9. Ducts sealed - longitudinal seams on rigid ducts; transverse seams on all ducts; UL 181A or 181B tapes and mastics
10. Hot water pipe insulation: 1.5 in. for pipes ≤1.5 in. and 2 in. for pipes >1.5 in.  
Chilled water/refrigerant/brine pipe insulation: 1.5 in. for pipes ≤1.5 in. and 1.5 in. for pipes >1.5 in.  
Steam pipe insulation: 1.5 in. for pipes ≤1.5 in. and 3 in. for pipes >1.5 in.  
*Exception(s):*
- Piping within HVAC equipment.
  - Fluid temperatures between 55 and 105°F.
  - Fluid not heated or cooled with renewable energy.
  - Piping within room fan-coil (with AHRI440 rating) and unit ventilators (with AHRI840 rating).
  - Runouts <4 ft in length.
11. Operation and maintenance manual provided to building owner
12. Balancing devices provided in accordance with IMC 603.17
13. Demand control ventilation (DCV) present for high design occupancy areas (>40 person/1000 ft<sup>2</sup> in spaces >500 ft<sup>2</sup>) and served by systems with any one of 1) an air-side economizer, 2) automatic modulating control of the outdoor air damper, or 3) a design outdoor airflow greater than 3000 cfm.  
*Exception(s):*
- Systems with heat recovery.
  - Multiple-zone systems without DDC of individual zones communicating with a central control panel.
  - Systems with a design outdoor airflow less than 1200 cfm.
  - Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1200 cfm.
14. Motorized, automatic shutoff dampers required on exhaust and outdoor air supply openings  
*Exception(s):*
- Gravity dampers acceptable in buildings <3 stories
15. Automatic controls for freeze protection systems present
16. Exhaust air heat recovery included for systems 5,000 cfm or greater with more than 70% outside air fraction or specifically exempted  
*Exception(s):*
- Hazardous exhaust systems, commercial kitchen and clothes dryer exhaust systems that the International Mechanical Code prohibits the use of energy recovery systems.
  - Systems serving spaces that are heated and not cooled to less than 60°F.
  - Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
  - Heating systems in climates with less than 3600 HDD.
  - Cooling systems in climates with a 1 percent cooling design wet-bulb temperature less than 64°F.

- Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
- Laboratory fume hood exhaust systems that have either a variable air volume system capable of reducing exhaust and makeup air volume to 50 percent or less of design values or, a separate make up air supply meeting the following makeup air requirements:
  - a) at least 75 percent of exhaust flow rate, b) heated to no more than 2°F below room setpoint temperature, c) cooled to no lower than 3°F above room setpoint temperature, d) no humidification added, e) no simultaneous heating and cooling.

## Section 5: Compliance Statement

*Compliance Statement:* The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical alteration project has been designed to meet the 2009 IECC, Chapter 8, requirements in COMcheck Version 3.9.3 and to comply with the mandatory requirements in the Requirements Checklist.

\_\_\_\_\_  
Name - Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## Section 6: Post Construction Compliance Statement

- HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.
- HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.
- Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

\_\_\_\_\_  
Principal Mechanical Designer-Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

ADMINISTRATION BUILDING PER UMC 2006 TABLE 4.1

ROOM	SQ.FT	OUTSIDE AIR CFM/SF	NUMBER FIXTURES	EXH PER FIXTURE	TOTALS
LOBBY/CORRIDORS 101,109	383	0.05			19.15
OFFICE 104	165	0.08			13.2
OFFICE 105	164	0.08			13.12
OFFICE 106	162	0.08			12.96
STORAGE 102	65	0.05			3.25
OFFICE 201	733	0.08			58.64
RESTROOM 204	NA	NA	1	50	50
MECH ROOM/COMPUTER	100	0.05			5
CORRIDOR 203/205	211	0.05			10.55
TOTAL MINIMUM OUTSIDE AIR					185.87

MAINTENANCE BUILDING PER UMC 2006 TABLE 4.1

ROOM	SQ.FT	OUTSIDE AIR CFM/SF	NUMBER FIXTURES	EXH PER FIXTURE	TOTALS
CORRIDORS 114,120,121	762	0.05			38.1
OFFICE 119	185	0.08			14.8
BREAK ROOM 122	355	0.25			88.75
CONFERENCE ROOM 118	555	0.2			111
RESTROOM 123	NA	NA	2	50	100
RESTROOM 127	NA	NA	4	50	200
JANITOR	NA	NA	1	50	50
LOCKER ROOM 126	127	0.2		25.4	25.4
LOCKER ROOM 128	339	0.2		67.8	67.8
SHOWER 124	22	0.25		5.5	5.5
SHOWER 129	203	0.25		50.75	50.75
TOTAL MINIMUM OUTSIDE AIR					752.1

MAINTENANCE BUILDING ROOMS 122-129 AIR BALANCE TABLE

ROOM	MINIMUM OUTSIDE AIR CFM	COOLING CFM	RETURN CFM	TRANSFER CFM	EXHAUST CFM	EXHAUST CFM + RETURN CFM= COOLING CFM
BREAK ROOM 122	88.75	820	820	75*	0	
RESTROOM 123	100	200	0	0	200	
RESTROOM 127	200	330	0	0	330	
JANITOR 125	20	75	0	0	75	
LOCKER ROOM 126	25.4	145	0	40*	145	
LOCKER ROOM 128	67.8	420	0		420	
SHOWER 124	5.5	40	0		40	
SHOWER 129	50.75	335	0	335*	335	
TOTALS	558.2	2365	820	0	1545	2365

NOTE:

1. ASKERISK(\*) SHOWS TRANSFER CFM MOVED TO COOLING CFM COLUMN FOR JANITOR 125, SHOWER 124 AND SHOWER 129
2. COOLING CFM MUST BE EXHAUSTED FOR TOILET, SHOWERS, JANITOR AND LOCKER ROOMS 123 THRU 129, AIR IS NOT ALLOWED TO BE RECIRCULATED.