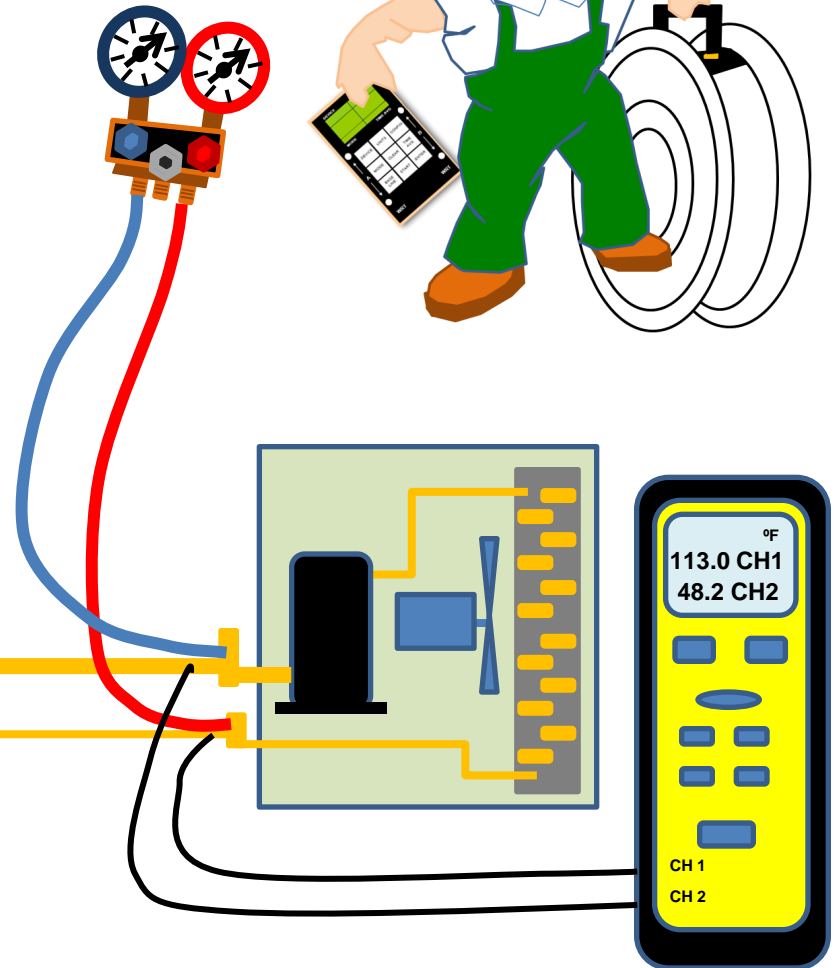
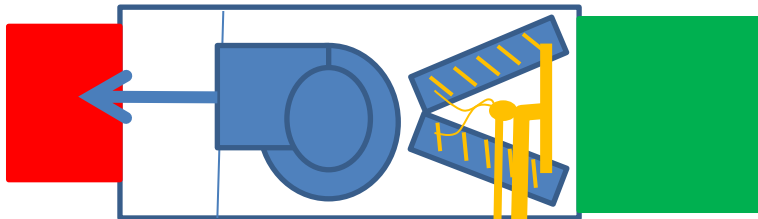


Verifying HVAC System Performance



A Commissioning Process

Identifying

Measuring

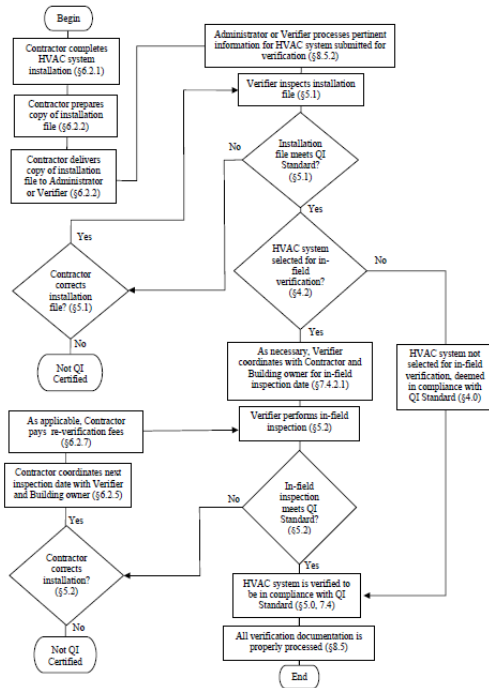
Recording



Comparing the recorded data to designed parameters and OEMs performance tables.

Procedures

Standardized



Organized



Recognized



Functional

$$\sqrt{144 \cdot 7} = 12\sqrt{7}, \quad f) \sqrt{49 \cdot 11} = 7\sqrt{11}.$$

2) $2\sqrt{11}$, b) $3\sqrt{7}$, c) $6\sqrt{3}$, d) $13\sqrt{2}$, e) $17\sqrt{2}$, b) $7\sqrt{3}$, c) $5\sqrt{6}$, d) $6\sqrt{7}$, e) $11\sqrt{2}$.
 $2 \cdot 5\sqrt{3} + 3 \cdot 2\sqrt{3} - 3\sqrt{3} = 10\sqrt{3} + 6\sqrt{3} - 3\sqrt{3}$
 $3 \cdot 5\sqrt{2} - 2 \cdot 7\sqrt{2} - 4\sqrt{2} = 15\sqrt{2} - 14\sqrt{2} - 4\sqrt{2}$
 $2 \cdot 3\sqrt{7} - 5\sqrt{7} + 4 \cdot 2\sqrt{7} = 6\sqrt{7} - 5\sqrt{7} + 8\sqrt{7}$
 $3 \cdot 2\sqrt{5} - 7\sqrt{5} - \frac{1}{2} \cdot 4\sqrt{5} + 5\sqrt{5} = 6\sqrt{5} - 7\sqrt{5} - 2\sqrt{5} + 5\sqrt{5}$
 $2 \cdot 5\sqrt{3} - 4 \cdot 4\sqrt{3} - 3 \cdot 15\sqrt{3} = -51\sqrt{3}$, b) $4\sqrt{5}$, c) $11\sqrt{2}$, d) $13\sqrt{2}$.
 5) a) $1 - 39\sqrt{7}$, b) $14\sqrt{5}$, c) $-19\sqrt{3}$, d) $13\sqrt{2}$.
 6) a) 5 , b) 126 , c) 12 , d) $25ab$, e) $x + 3$, f) $1 + \dots$

Standardized Recording

OEM Start-Up Log

ACCA Start-Up Checklist

Energy Star

CLIMATEMASTER WATER-SOURCE HEAT PUMPS

Packaged Units
Rev: 03 January, 2011

Start-Up Log Sheet

Installer: Complete unit and system checkout and follow unit start-up procedures in the IOM. Use this form to record unit information, temperatures and pressures during start-up. Keep this form for future reference.

Job Name: _____ Street Address: _____
 Model Number: _____ Serial Number: _____
 Unit Location in Building: _____
 Date: _____ Sales Order No: _____

In order to minimize troubleshooting and costly system failures, on the system is put into full operation.

Fan Motor: Speed Tap (PSC) or CFM Settings (ECM) _____
 Temperatures: F or C _____
 Pressures: PSIG or kPa _____

Cooling Mode	
Entering Fluid Temperature	
Leaving Fluid Temperature	
Temperature Differential	
Return-Air Temperature	DB _____ V _____
Supply-Air Temperature	DB _____ V _____
Temperature Differential	
Water Coil Heat Exchanger (Water Pressure IN)	
Water Coil Heat Exchanger (Water Pressure OUT)	
Pressure Differential	
Water Flow GPM	
Compressor	
Amps	
Volts	
Discharge Line Temperature	
Motor	
Amps	
Volts	

Allow unit to run 15 minutes in each mode before taking data.
 Do not connect gauge lines

RESIDENTIAL START UP SHEET

RETURN TO TECH SERVICE DEPARTMENT
 Eric Kravitz Fax: 717-928-2069 | Josh Wheale Fax: 717-928-2059

INSPECTION INFORMATION

Dealer Name: _____
 Job Name: _____
 Inspection Date: _____
 Primary Complaint: _____

Service Tech: _____
 Location: _____
 Inspection Time: _____

EQUIPMENT INFORMATION

Indoor Model # _____
 Outdoor Model # _____
 Install Date: _____
 Duct System Return Size: _____
 Duct System Supply Size: _____
 Supply Static Press: _____
 Supply Air Dry Bulb: _____
 Supply Air Wet Bulb: _____

Indoor Serial # _____
 Outdoor Serial # _____
 Air Filter Size: _____
 Return Static: _____
 Return Air Dry Bulb: _____
 Return Air Wet Bulb: _____

HEAT PUMP	AIR CONDITIONER	GAS	GEOTHERMAL
<input type="checkbox"/> R22 <input type="checkbox"/> R410A	<input type="checkbox"/> R22 <input type="checkbox"/> R410A	<input type="checkbox"/> NG <input type="checkbox"/> LP	<input type="checkbox"/> R22 <input type="checkbox"/> R410A
Suction PSI _____	Suction PSI _____	Incoming Pressure _____	Loop <input type="checkbox"/> Open <input type="checkbox"/> Closed
Liquid PSI _____	Liquid PSI _____	Manifold Pressure _____	Water Pressure In _____
Discharge Temp _____	Supheheat _____	Venting Size _____	Water Pressure Out _____
Lk: _____			
Ar: _____			
W: _____			
Lk: _____			
C: _____			
D: _____			

Special Jobsite Notes: _____
 HVAC Technician Findings: _____
 Technician Signature: _____ Customer Signature: _____

QUESTIONS? CALL US AT 800-228-4822 x5 OR EMAIL TECHSUPPORT@HVACDIST.COM

START-UP CHECKLIST

Job # _____ Call Slip # _____ Start-Up Date: _____

Customer Name: _____ Address: _____
 Outdoor Unit Manufacturer: _____ Model No: _____ S/N: _____
 Indoor Unit Manufacturer: _____ Model No: _____ S/N: _____

Equipment Installed: HP Air Handler Condenser Furnace Coil Water Heater Boiler Gas Log/Piece

Outdoor Unit: Liquid line filter installed? Yes No TXV installed? Yes No
 Connections leak checked? Yes No System evacuation? Yes No
 Micron reading: _____ Compressor amps: _____
 Supply voltage: _____ Fan amps: _____
 Lbs. of refrigerant added: _____ H/P checked in: heating cooling both
 OD temperature (°F): _____ ID temperature (°F): _____ ID WB (°F): _____ Cool Δ T (°F): _____
 Cooling Mode above 55°F: _____ Suction # _____ Head # _____
 H/P Heating Mode: Suction # _____ Head # _____ S/C (°F): _____
 System left fully operational? Yes No Start up only/need to return? Yes No
 Dip switches set? Yes No

Gas manifold pressure (W.C.): _____
 Configuration properly set? Yes No Ten
 Total BTUs: _____
 Safeties checked? Yes No
 Gas per pitch? Yes No Proper connector

(If over 75 PSI quote expansion tank)
 Actual temperature (°F): _____
 Flashed out? Yes No
 Installed? Yes No Pump tested? Yes No
 Humidistat properly installed? Yes No
 Draining inside only? Yes No
 Seasoned? Yes No
 System operation explained to customer? _____
 Filter maintenance explained to customer? _____
 Date: _____
 Date: _____



See check www.acca.org/links for an updated version of this form and
 notes and should not be used on an as such and are for general information
 it can only be provided in response to specific field situations. ACCA has
 no liability for errors or omissions. ACCA is not responsible for any
 errors or standards included in the form's nomenclature.



PTCS™ Commissioned Heat Pump Certificate & Startup Form

All sections must be filled out by a PTCS-certified Technician at the time of installation. A copy of the completed form must be promptly submitted to the utility and homeowner in accordance with utility policy. Please enter online at www.ptcsinc.com or fax to 877-948-4074.
 Questions? Call 800-948-3557 or email resrvac@psa.gov Last updated: January 2012

Site Information

PTCS # _____ Installation Company _____ Electric Utility _____
 Customer Name _____ Street Address _____
 City _____ State _____ Zip Code _____ Phone Number _____
 Site Built: Existing New Construction
 Year Built: _____
 Energy Star? Yes No
 Foundation: Full Basement Full Basement Craw Space Slab
 D/D Heating system being replaced: Rec. Furnace Heat Pump Gas Furnace
 (check if kept as back up heat) Boiler (specify) _____
 Heated Area (sq ft) _____
 New Heat Pump Equipment Data
 ARI# _____ SEER _____ HSPF _____
 Outdoor (OD) Unit Mod. # _____ EER _____
 Unit Make _____ Number of compressor stages or
 Indoor (ID) Unit Mod. # _____ Inverter driven heat pump
 Capacity (tons) _____
 E _____

Utility Program

1. Measure return static pressure. _____
 2. Return Static Pressure _____ Units (check one) _____
 3. Measure supply plenum static pressure. _____
 4. External Static Pres. add _____
 #2 and #3 values together (ignore minus sign)

1. Return Static Pressure _____ Units (check one) _____
 2. Supply Plenum Static Pressure _____
 4. External Static Pressure _____

TrueFlow Test
 1. Measure Normal System Operating Pressure (NGOP). _____
 2. Plate Size _____ Units _____
 3. Check TrueFlow plate size _____
 3. Filter Location: Air Handler Return Grille
 3. Note TrueFlow plate location _____
 3. Other (specify): _____

ENERGY STAR Qualified Homes, Version 3 (Rev. 06) HVAC System Quality Installation Contractor Checklist 1

System Description *	Cooling system for temporary occupant load? ¹ Yes <input type="checkbox"/> No <input type="checkbox"/>	Builder Verified	Cont. Verified	N/A
1. Whole-Building Mechanical Ventilation Design ⁴				
1.1 Ventilation system installed that has been designed to meet ASHRAE 62.2-2010 requirements including, but not limited to, requirements in Items 1.2, 1.5, 1.6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Ventilation system does not utilize an intake duct to the return side of the HVAC system unless the system is designed to operate intermittently and automatically based on a timer and to restrict outdoor air intake when not in use (e.g., motorized damper).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Documentation is attached with ventilation system type, location, design rate, and frequency and duration of each ventilation cycle.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4 If present, continuously-operating vent. & exhaust fans designed to operate during all occupiable hours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 If present, intermittently-operating whole-house ventilation system designed to automatically operate at least once per day and at least 10% of every 24 hours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Heating & Cooling System Design ^{4,5} Parameters used in the design calculations shall reflect home to be built, specifically: outdoor design temperature, home orientation, number of bedrooms, conditioned floor area, window area, predominant window performance and insulation levels, infiltration rate, mechanical ventilation rate, presence of MERV10 or better filter, and indoor temperature setpoints = 70°F for heating; 75°F for cooling				
2.1 Heat Loss / Gain Method: <input type="checkbox"/> Manual J v8 <input type="checkbox"/> 2009 ASHRAE <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Duct Design Method: <input type="checkbox"/> Manual <input type="checkbox"/> Manual D <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.8 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.9 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.10 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.11 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.12 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.13 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.14 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.15 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.17 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.18 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.19 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.20 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.21 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.22 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.23 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.24 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.25 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.26 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.27 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.28 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.29 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.30 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.31 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.32 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.33 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.34 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.35 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.36 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.37 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.38 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.39 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.40 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.41 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.42 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.43 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.44 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.45 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.46 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.47 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.48 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.49 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.50 Equipment Selection Method: <input type="checkbox"/> Manual S <input type="checkbox"/> OEM Rec. <input type="checkbox"/> Other: _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Organized Recording

HVAC System Quality Installation Contractor Checklist

6. Refrigerant Tests - Run system for 15 minutes before testing			
Note: If outdoor ambient temperature at the condenser is $\leq 55^{\circ}\text{F}$ or, if known, below the manufacturer-recommended minimum operating temperature for the cooling cycle, then the system shall include a TXV, and the contractor shall mark "N/A" on the Checklist for Section 6 & 7. ²¹			
6.1 Outdoor ambient temperature at condenser:	___ °F DB	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Return-side air temperature inside duct near evaporator, during cooling mode:	___ °F WB	<input type="checkbox"/>	<input type="checkbox"/>
6.3 Liquid line pressure:	___ psig	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Liquid line temperature:	___ °F DB	<input type="checkbox"/>	<input type="checkbox"/>
6.5 Suction line pressure:	___ psig	<input type="checkbox"/>	<input type="checkbox"/>
6.6 Suction line temperature:	___ °F DB	<input type="checkbox"/>	<input type="checkbox"/>
7. Refrigerant Calculations			
For System with Thermal Expansion Valve (TXV):			
7.1 Condenser saturation temperature:	_____ °F DB (Using Value 6.3)	<input type="checkbox"/>	<input type="checkbox"/>
7.2 Subcooling value:	_____ °F DB (Value 7.1 - Value 6.4)	<input type="checkbox"/>	<input type="checkbox"/>
7.3 OEM subcooling goal:	_____ °F DB	<input type="checkbox"/>	<input type="checkbox"/>
7.4 Subcooling deviation:	_____ °F DB (Value 7.2 – Value 7.3)	<input type="checkbox"/>	<input type="checkbox"/>
9. Air Flow Tests			
9.1 Air volume at evaporator:	_____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
9.2 Test performed in which mode?	<input type="checkbox"/> Heating <input type="checkbox"/> Cooling	<input type="checkbox"/>	<input type="checkbox"/>
9.3 Return duct static pressure:	_____ IWC Test Hole Location: ²² _____	<input type="checkbox"/>	<input type="checkbox"/>
9.4 Supply duct static pressure:	_____ IWC Test Hole Location: ²² _____	<input type="checkbox"/>	<input type="checkbox"/>
9.5 Test hole locations are well-marked and accessible ²²		<input type="checkbox"/>	<input type="checkbox"/>
9.6 Airflow volume at evaporator (Value 9.1), at fan design speed and full operating load, $\pm 15\%$ of the airflow required per system design (Value 2.16) or within range recommended by OEM		<input type="checkbox"/>	<input type="checkbox"/>

Procedures that Work

HVAC System QI Checklist

Customer Name: _____ Building Plan ID: _____ Building: EC NC ER NR
 Building Address: _____ Zone Name: _____

Equipment Information

<input type="checkbox"/> Furnace Unit Model # _____	<input type="checkbox"/> Coil Unit Model # _____	<input type="checkbox"/> A/C Cond Unit Model # _____
<input type="checkbox"/> Boiler Unit Serial # _____	<input type="checkbox"/> Elect Hr Unit Serial # _____	<input type="checkbox"/> H/P Cond Unit Serial # _____
<input type="checkbox"/> Fan Coil Unit Serial # _____	<input type="checkbox"/> Other Unit Serial # _____	<input type="checkbox"/> Other Unit Serial # _____

Equipment specified in the installation file matches the equipment found during in-field verification

Installation File Verification

Equipment Matching: AHRI CEE Directory OEM Catalog Data

Load Calculation

Winter OD Temp: _____ ID Temp: _____
 Summer OD Temp: _____ ID Temp: _____
 Design Grains: _____ @ RH: _____
 Latitude: _____ Altitude: _____
 Building orientation: _____
 # Occupants: _____ Ventilation rate: _____
 Infiltration estimate: _____
 Ducts (correct duct table used?): Yes No
 Math: Heating: _____ Math: Cooling: _____
 Random Comp. Load 1: _____
 Random Comp. Load 2: _____
 Random Comp. Load 3: _____
 Random Comp. Load 4: _____
 Random Comp. Load 5: _____

In-field Verification

Airflow (access indoor heat exchanger): Pass

Meas. Airflow: _____
 Design Airflow: _____
 *MOT: _____
 † Meas. 1: _____ † Meas. 2: _____ † Meas. 3: _____ † Meas. 4: _____ † Meas. 5: _____ † Meas. 6: _____ † Meas. 7: _____

Refrigerant Charge: Pass

Ref. Line Temp: _____ Ref. Pressure: _____
 EA Wet Bulb: _____ OD Dry Bulb: _____
 *MOT: _____

† Building: NC - New Commercial, EC - Existing Commercial, NR - New Residential, ER - Existing Residential
 * MOT: Method of Test (e.g., Superheat or Subcooling, Pressure Matching or Static Pressure, etc.)
 † Approved methods require different measurements. Measurements will correlate to MOT and QVP Table 2 Required Information Reported by the Verifier

Figure A5: HVAC System QI Checklist (Page 1)

In-field Verification cont.

Pass

Nameplate: _____
 Nameplate: _____
 Nameplate: _____
 Nameplate: _____

Airflow Balance:

*MOT: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____
 Room name: _____
 Design: _____

Installer Print and Date _____
 Verifier Print and Date _____

Figure A6: HVAC System QI Checklist (Page 2)



HVAC Quality Installation Verification Protocols

Establishes Minimum Requirements for Verifying That Residential and Light Commercial HVAC Systems Meet the ANSI/ACCA 5 QI - 2010 (HVAC Quality Installation Specification) Standard.

The Air Conditioning Contractors of America Educational Institute (ACCA-EI) Standards Task Team (STT) develops standards as an American National Standards Institute (ANSI) accredited standards developer (ASD). ACCA develops voluntary standards as outlined in the ACCA Essential Requirements and the ANSI Essential Requirements. ACCA standards are developed by diverse groups of industry volunteers in a climate of openness, consensus building, and lack of dominance (e.g., committee/group/team balance). Essential requirements, standard activities and documentation can be found in the standards portion of the ACCA website at www.acca.org. Questions, suggestions, and proposed revisions to this standard can be addressed to the attention of the Standards Task Team, ACCA, 2800 Shirlington Road, Suite 300, Arlington, VA 22206.



ENERGY STAR Installation Pilot Commissioning Report

Date: _____ Time: _____

Site Information

Address 1: _____
 Address 2: _____
 City: _____ State: _____ Zip: _____

Design

Heat Gain Method: Manual J v7 Manual J v8 None Other (specify): _____
 Duct Design Method: Manual D None Other (specify): _____
 Equipment Specification method: Manual S OEM Recommendation Other (specify): _____
 Latent Heat Gain: _____ BTU/h Sensible Heat Gain: _____ BTU/h
 Total Heat Gain: _____ BTU/h Design Airflow: _____ CFM
 Duct Design Static Pressure: _____ IWC
 Type of Installation: Replacement New System - Existing Home New System - New Home
 Square Feet of Zone: _____ sqft

Equipment

Condenser: Manufacturer: _____ Model: _____
 Serial Number: _____
 Evaporator: Manufacturer: _____ Model: _____
 Serial Number: _____

System
 Metering Device: TXV Fixed Orifice Other (specify): _____
 Refrigerant: R-22 R-410a Other (specify): _____
 Refrigerant Charge Goal (for TXV): _____ Subcooling _____ Approach (for Leaker only)
 Fan Motor Type: Fixed Speed (e.g. PSC) Variable (e.g. GE ECH)
 Latent Capacity: _____ BTU/h Sensible Capacity: _____ BTU/h
 Total Capacity: _____ BTU/h
 ARI EER/SEER: _____ (14 or higher) ARI Ref #: _____

Air Flow Tests

Static Pressure: Return Static _____ IWC Supply Static _____ IWC
 Measured Air Volume @ evaporator: _____ CFM
 Volume Measurement Method Used: TrueFlow Anemometer Pressure Matching (w/ Duct Blaster) Other:
 Evaporator/Air Handler Fan Power: Pre: _____ Amps _____ volts _____ watts
 Post: _____ Amps _____ volts _____ watts
 Condenser Fan Power: Pre: _____ Amps _____ volts _____ watts
 Post: _____ Amps _____ volts _____ watts
 Compressor Power: Pre: _____ Amps _____ volts _____ watts
 Post: _____ Amps _____ volts _____ watts

Speed Setting: Fixed: Low Med-Low Med Med-High High CFM (for setting): _____
 >>> OR <<<<
 Speed Setting: Variable: Fan set for: _____ CFM

Figure A2: EPA EnergyStar Commissioning Report (Page 1)

THE RECORDING FORM IS MEANT TO ALIGN WITH ACCA STANDARDS 5 AND 9



ACCA Standard 5

2800 Shirlington Road
Suite 300
Arlington, VA 22206

703.575.4477
Fax 703.575.8107

www.acca.org

STANDARD NUMBER: ANSI/ACCA 5 QI-2010

HVAC Quality Installation Specification

Residential and Commercial Heating,
Ventilating, and Air Conditioning (HVAC)
Applications

The Air Conditioning Contractors of America Educational Institute (ACCA-EI) Standards Task Team (STT) develops standards as an American National Standards Institute (ANSI) accredited standards developer (ASD). ACCA develops voluntary standards as outlined in the ACCA Essential Requirements and the ANSI Essential Requirements. ACCA standards are developed by diverse groups of industry volunteers in a climate of openness, consensus building, and lack of dominance (e.g., committee/group/team balance). Essential requirements, standard activities and documentation can be found in the standards portion of the ACCA website at www.acca.org. Questions, suggestions, and proposed revisions to this standard can be addressed to the attention of the Standards Task Team, ACCA, 2800 Shirlington Road, Suite 300, Arlington, VA 22206.

ACCA Standards are updated on a five-year cycle. The date following the standard number is the year of approval release by the ACCA-EI Standards Task Team. The latest copy may be purchased from the ACCA online store at www.acca.org or ordered from the ACCA bookstore via toll-free telephone at 888.290.2220.



www.ansi.org

CALCS-PLUS



ACCA Standard 9

2800 Shirlington Road
Suite 300
Arlington, VA 22208

703.575.4477
Fax 703.575.8107

www.acca.org

STANDARD NUMBER: ANSI/ACCA 9 QIvp - 2011

HVAC Quality Installation Verification Protocols

Establishes Minimum Requirements for
Verifying That Residential and Light
Commercial HVAC Systems Meet the
ANSI/ACCA 5 QI - 2010 (*HVAC Quality
Installation Specification*) Standard.

The Air Conditioning Contractors of America Educational Institute (ACCA-EI) Standards Task Team (STT) develops standards as an American National Standards Institute (ANSI) accredited standards developer (ASD). ACCA develops voluntary standards as outlined in the ACCA Essential Requirements and the ANSI Essential Requirements. ACCA standards are developed by diverse groups of industry volunteers in a climate of openness, consensus building, and lack of dominance (e.g., committee/group/team balance). Essential requirements, standard activities and documentation can be found in the standards portion of the ACCA website at www.acca.org. Questions, suggestions, and proposed revisions to this standard can be addressed to the attention of the Standards Task Team, ACCA, 2800 Shirlington Road, Suite 300, Arlington, VA 22206.

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Documentation Tool

Cx Checklist Residential 10-19-12.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat PDF-XChange 4

Clipboard Font Alignment Number Styles Cells Editing

K17

Air Conditioner Commissioning Checklist											
Fill out this form for each system											
								Date			
Job Name 0				Contractor 0							
Address 0				Address 0							
City 0		State 0		City 0		State 0					
ZIP 0						ZIP 0					
Technician 0				Verifier 0							
Equipment to be Commissioned											
Condenser MFG				Model #							
				Serial #							
Evap or AHU MFG				Model #							
				Serial #							
Furnace				Model #							
Fill out Gas Furnace Tab and CAZ Tab				Serial #							
AHRI Certification #				OEM Performance Data Attached Y/N							
OEM BTU/h output at				%F Outdoor Temperature							
When Indoor conditions are		75°F		Dry Bulb		63°F		Wet Bulb			
Sensible Output =		Sensible Output=		at		CFM					
HVAC Load Calculations				Cooling		Coincident		Design		Calcs	
(for new construction, must be room by room calculation)				1% DB		Wet Bulb		Grains		Attached	
Manual J Table 1 Outdoor Conditions								Diff		Y/N	
Required Net Cooling =				Required Sensible Cooling =							
Design Airflow =				CFM							
Data Collection											
Indoor Section											
Airflow at Evap Coil				CFM		ODA Intake		CFM			
Measurement Method											
Fan Speed Setting				FLA		RLA		Voltage			
RA Plenum Static Pressure IWC				SA Plenum Static Pressure IWC							
Complete the next 4 entries while the Refrigeration Measurements are taken											
Entering Dry Bulb				%F		Entering Wet Bulb		%F			

Ready | General | Air Conditioner | Heat Pump | Gas Furnace | 100%



Work In Progress

Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat PDF-XChange 4

Clipboard Font Alignment Number Styles Cells Editing

A20 Note: If furnace or water heater is a natural aspirating combustion appliance, a CAZ test must

Cx Checklist Residential 2-24-13.xlsx

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2	HVAC Commissioning Checklist												
3	Fill out this form for each system					Date							
4													
5	Job Name				Contractor								
6	Address				Address								
7	City		State		City		State						
8			ZIP				ZIP						
9													
10	Technician				Verifier								
11	Equipment to be Commissioned												
12	Condenser MFG				Model #								
13					Serial #								
14	Evap or AHU MFG				Model #								
15					Serial #								
16					Equipment Combination AHRI #								
17	Furnace				Model #								
18					Serial #								
19					AHRI #								
20	Note: If furnace or water heater is a natural aspirating combustion appliance, a CAZ test must be performed												
21													

Ready | General | Air Conditioner | Heat Pump | Gas Furnace | CAZ | Superheat Look-up | TP Chart | Change Log | 100%



Air Conditioning Tab

Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat PDF-XChar

Calibri 11

General Conditional Formatting

M23

Cx Checklist Residential 2-24-13.xlsx

Air Conditioner Commissioning Checklist									
Fill out this form for each system								Date	
Job Name 0					Contractor 0				
Address 0					Address 0				
City 0		State 0			City 0		State 0		
ZIP 0					ZIP 0				
Technician 0					Verifier 0				
Equipment to be Commissioned									
Condenser MFG					Model #				
					Serial #				
Evap or AHU MFG					Model #				
					Serial #				
Furnace					Model #				
Fill out Gas Furnace Tab and CAZ Tab					Serial #				
AHRI Certification #					OEM Performance Data Attached Y/N				
OEM BTU/h output at					°F Outdoor Temperature				
When Indoor conditions are		75°F Dry Bulb		63°F Wet Bulb					
Net Output =		Sensible Output =			at		CFM		
HVAC Load Calculations (for new construction, must be room by room calculation)									
Heating 98% DB		Cooling 1% DB		Coincident Wet Bulb		Design Grains Diff		Daily Range	
Calcs Attached Y/N									
Outdoor Conditions									
Net Heat Gain =		Sens =		Heat Loss =					
Design Airflow =		0 CFM							

Ready

Data Collection			
Indoor Section			
Airflow at Evap Coil	0 CFM	ODA Intake	CFM
Measurement Method			
Fan Speed Setting	FLA	RLA	Voltage
RA Plenum Static Pressure IWC		SA Plenum Static Pressure IWC	
Measured Airflow is #DIV/0! of Design Airflow			
Complete the next 4 entries while the Refrigeration Measurements are taken			
Entering Dry Bulb	°F	Entering Wet Bulb	°F
Leaving Dry Bulb	°F	Leaving Wet Bulb	°F
Δ DB	0	Δ WB	0

Outdoor Section			
Electrical Measurements			
Compressor	FLA	RLA	
OD Fan	FLA	RLA	
Operating voltage			
Outdoor Section (Out Door Dri Bulb shall be above 55° F)			
Refrigeration Measurements			
Note: DO NOT COMPLETE THIS SECTION UNTILL AIRFLOW AT EVAPORATOR COIL IS VERIFIED			
The Refrigeration System shall run for 15 before measurements are taken			
Refrigerant Type		Metering Device	
Outdoor Ambient Temp		°F DB	
Liquid Line Pressure		Liquid Line Temperature	
Cond Sat Temperature			
Suction Line Pressure		Suction Line Temperature	
Evap Sat Temperature			
If TXV			
OEM Required Sub Cooling		Measured Sub Cooling 0	
Sub Cooling Deviation 0		Must be +/- 3° of OEM	
If Fixed Orifice or Cap Tube metering device			
Superheat Goal		Measured Superheat 0	
Superheat must be +/- 5°F of Goal			

Heat Pump Tab

Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat

Calibri 11

General Conditional Formatting

Format as Table

Cell Styles

N22

Cx Checklist Residential 2-24-13.xlsx

A	B	C	D	E	F	G	H	I
Heat Pump Commissioning Checklist								
Fill out this form for each system						Date		
Job Name			Contractor					
Address			Address					
City		State		City		State		
ZIP				ZIP				
Technician			Verifier					
Equipment to be Commissioned								
Condenser MFG			Model #					
			Serial #					
Evap or AHU MFG			Model #					
			Serial #					
AHRI Certification #			OEM Performance Data Attached Y/N					
OEM BTU/h output at			°F Outdoor Temperature					
When indoor conditions are		75°F	Dry Bulb	63°F	Wet Bulb			
Net Output =		Sensible Output=		at		CFM		
OEM Heating Out Put		Outdoor Temp		47°F	COP			
Indoor Temp		70°F	Outdoor Temp		17°F	COP		
HVAC Load Calculations (for new construction, must be room by room calculation)								
Heating		98% DB	Cooling	1% DB	Coincident Wet Bulb	Design Grains Diff	Daily Range	Attached Y/N
Outdoor Conditions								
Net Heat Gain =		Sens =		Heat Loss =				
Design Airflow =		0 CFM						
Data Collection								

Data Collection			
Indoor Section			
Airflow at Evap Coil	0 CFM	ODA Intake	CFM
Measurement Method			
Fan Speed Setting	FLA	RLA	Voltage
RA Plenum Static Pressure IWC		SA Plenum Static Pressure IWC	
Measured Airflow is #DIV/0! of Design Airflow			
Complete the next 4 entries while the Refrigeration Measurements are taken			
Entering Dry Bulb	°F	Entering Wet Bulb	°F
Leaving Dry Bulb	°F	Leaving Wet Bulb	°F
Δ DB	0	Δ WB	0
Outdoor Section			
Electrical Measurements			
Compressor	FLA	RLA	
OD Fan	FLA	RLA	
Operating voltage			
Outdoor Section - Cooling (Out Door Dri Bulb shall be above 55° F)			
Refrigeration Measurements			
Outdoor Section - Heating (Out Door Dri Bulb shall be below 65° F)			
Refrigeration Measurements			
Note: DO NOT COMPLETE THIS SECTION UNTILL AIRFLOW AT EVAPORATOR COIL IS VERIFIED			
The Refrigeration System shall run for 15 before measurements are taken			
Refrigerant Type		Metering Device	
Outdoor Ambient Temp		°F DB	
Liquid Line Pressure		Liquid Line Temperature	
Cond Sat Temperature			
Suction Line Pressure		Suction Line Temperature	
Evap Sat Temperature			
If TXV			
OEM Required Sub Cooling		Measured Sub Cooling	0
Sub Cooling Deviation	0	Must be +/- 3° of OEM	
If Fixed Orifice or Cap Tube metering device			
Superheat Goal		Measured Superheat	0
Superheat must be +/- 5°F of Goal			
Electric Resistance back-up \ auxiliary			
Auxiliary (strip) heat lockout		° F	Controle Type
Stage 2 heat		° F	Discharge air sensor
Stage 3 heat		° F	AHU board or zone control
Stage 4 heat		° F	Outdoor Thermostat
Stage 5 heat		° F	Other (Specify):
Balance Point attached Y/N			

Gas Furnace Tab

Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat PDF-XC

Clipboard Font Alignment Number Styles

K11

Cx Checklist Residential 2-24-13.xlsx

	A	B	C	D	E	F	G	H	I	
1	Gas Furnacer Commissioning Checklist									
2	Fill out this form for each system									
3							Date			
4										
5	Job Name 0				Contractor 0					
6	Address 0				Address 0					
7	City 0	State 0				City 0	State 0			
8	ZIP 0					ZIP 0				
9										
10	Technician 0				Verifier 0					
11	Equipment to be Commissioned									
12	Furnace				Model #					
13	Fill out Gas Furnace Tab and CAZ Tab				Serial #					
14	Note: If furnace or water heater is a natural aspirating combustion appliance, a CAZ test must be performed									
15										
16										
17	AHRI Certification #				OEM Performance Data Attached Y/N					
18	In Put BTU/h				Out Put BTU/h					
19	AFUE				Combustion Type				Y/N	
20	Natural Aspirating									
21	Sealed Combustion Cat 4									
22	Does Combustion air come from CAX									
23	When Indoor conditions are				70°F	Dry Bulb				
	HVAC Load Calculations (for new construction, must be room				Heating	Cooling	Coincident	Design	Daily	Calcs Attached

General Air Conditioner Heat Pump Gas Furnace CAZ Superheat U

	A	B	C	D	E	F	G	H	I
23	When Indoor conditions are			70°F	Dry Bulb				
	HVAC Load Calculations (for new construction, must be room by room calculation)			Heating 98% DB	Cooling 1% DB	Coincident Wet Bulb	Design Grains Diff	Daily Range	Calcs Attached Y/N
25									
26	Outdoor Conditions								
27	Net Heat Gain =			Sens =	Heat Loss =				
28	Design Airflow =			0 CFM					Y/N
29						Gas line checked for leaks?			
30	Fuel Type NAT or LP					Gas Meter Clocked?			
31	Gas manifold pressure (W.C.)					Vent piping checked?			
32	Orifice size:					Vent Pipe Proper pitch?			
33						Vent Pipe Proper connections?			
34						Safeties checked?			
35									
36	Blower								
37	Airflow Across Hx			0 CFM	ODA Intake	CFM			
38	Measurement Method								
39	Fan Speed Setting			FLA	RLA	Voltage			
40	RA Plenum Static Pressure IWC				SA Plenum Static Pressure IWC				
41	Measured Airflow is #DIV/0! of Design Airflow								
42	Complete the next 4 entries while the Refrigeration Measurements are taken								
43	Entering Dry Bulb				°F				
44	Leaving Dry Bulb				°F		CO Test (PPM):		
45	Δ DB			0					
46									

CAZ Tab

Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat PDF-XL

Clipboard Font Alignment Number Styles

A37 Proceed to page 2

Cx Checklist Residential 2-24-13.xlsx

A	B	C	D	E	F	G	H	I
CAZ - Combustion Appliance Zone (combustion appliance safety testing)								
Worse Case Depressurization / Draft Test								
NOTE: This test must be completed if there is a vented natural atmospheric combustion furnaces and water heater located in the conditioned space or any space adjacent to the conditioned space, i.e. garage, attic, utility, etc.								
This Test must be performed if a CAZ is present and if any air sealing (building envelope or								
Preparation							Check	Condition
VISUALLY INSPECT VENTING (of each Combustion Appliance)								
TURN OFF ALL COMBUSTION APPLIANCES.								
CLOSE ALL OPERABLE VENTS AND DAMPERS, not to include AC system								
CHECK DRYER VENT and LINT FILTER, must be clean								
CHECK FURNACE FILTER (clean or replace if needed)								
Close all doors to put the combustion appliance into the smallest								
IF BLOWER DOOR IS SET UP, BE SURE FAN IS COVERED.								
Setup Manometer and Pressure hoses to measure CAZ (WRT) Outdoors. Connect the CAZ to								
Record Baseline Pressure								
Turn on all exhaust fans including the cloths dryer (do not turn on whole-house fans).								
Open interior doors to rooms that have exhaust fans.								
If the house has a fireplace that the client uses, turn on the blower door to 300 CFM with Ring B to simulate.								

General Air Conditioner Heat Pump Gas Furnace CAZ Superheat

26	Record the Pre-air sealing and Post Air sealing Pressure Difference (ΔP) readings in pascals;				
27	Worse Case Depressurization	CAZ 1		CAZ 2	
28	TEST	Pre	Post	Pre	Post
29	Open door between CAZ and Main Body * of				
30	Close door between CAZ and Main Body * Record				
31	Turn on Furnace Blower. Check position of interior				
32	Turn on Furnace Blower. Check position of interior				
33	Open door between CAZ and Main Body of house. *				
34	* If no door is present, skip				

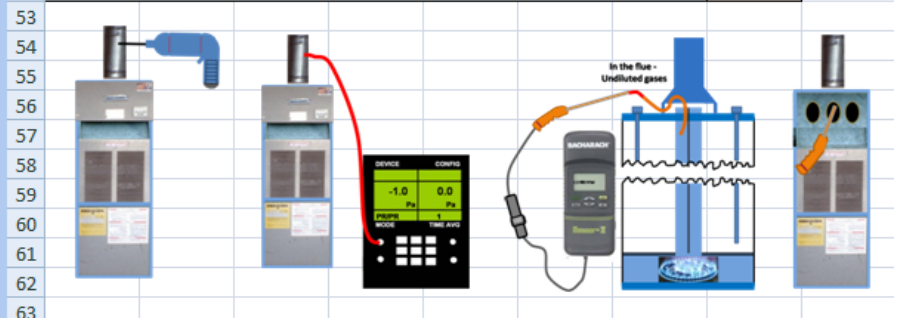
Appliance Draft and CO Test

Prepare vent pipe to receive draft probe.

50 Perform Worst Case Draft and Combustion Tests for each appliance under this worst case

51 Recreate Worst Case Conditions for each CAZ

52 Measure vent pressure with reference to the CAZ. Draft probe



Acceptable Draft Readings for Worst Case Draft Test at Listed Outdoor Temperatures ($^{\circ}F$)

	< 20 $^{\circ}$	21 - 40 $^{\circ}$	41 - 60 $^{\circ}$	61 - 80 $^{\circ}$	> 80 $^{\circ}$
	-5 Pa	-4 Pa	-3 Pa	-2 Pa	-1 Pa

69 NOTE:

70 If Vent wrt CAZ ΔP is positive – periodically check CAZ CO. If exceeds 35 ppm- STOP testing!

	Vent	Ambient
72 Vented Appliance	Draft	CO
73 Furnace		
74 Water Heater		

Combustion Dilution Air

Required CAZ Volume		CAZ Volume	
Appliance	Input BTU/H	Length	
78 Furnace		Width	
79 Water Heater		Height	
80 Dryer		CU FT	0
81 Other			
82 Total Input BTU/H	0		
83 Required Volume	0		

Superheat Look-Up Tab

Microsoft Excel

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Clipboard Font Alignment Styles Cells Editing

A1 SUPERHEAT CALCULATOR FOR NON-TXV SYSTEMS (R410A & R22)

Cx Checklist Residential 2-24-13.xlsx

SUPERHEAT CALCULATOR FOR NON-TXV SYSTEMS (R410A & R22)									
		Condenser Entering Air - Dry Bulb							
		55	56	57	58	59	60	61	62
Indoor Entering Wet Bulb	50	9	8.6	8.2	7.8	7.4	7	6.2	5.6
	51	10.5	10.1	9.7	9.3	8.9	8.5	7.4	6.3
	52	12	11.6	11.2	10.8	10.4	10	9.2	8.4
	53	13	12.6	12.2	11.8	11.4	11	10.4	9.8
	54	14	13.6	13.2	12.8	12.4	12	11.6	11.2
	55	15.5	15.1	14.7	14.3	13.9	13.5	13.1	12.7
	56	17	16.6	16.2	15.8	15.4	15	14.6	14.2
	57	18.5	18.1	17.7	17.3	16.9	16.5	16.1	15.7
	58	20	19.6	19.2	18.8	18.4	18	17.6	17.2
	59	21.5	21.1	20.7	20.3	19.9	19.5	19.1	18.7
	60	23	22.6	22.2	21.8	21.4	21	20.6	20.2
	61	24.5	24.1	23.7	23.3	22.9	22.5	22	21.5
	62	26	25.6	25.2	24.8	24.4	24	23.4	22.8
	63	27.5	27.1	26.7	26.3	25.9	25.5	24.9	24.3
	64	29	28.6	28.2	27.8	27.4	27	26.4	25.8
	65	30.5	30.1	29.7	29.3	28.9	28.5	27.9	27.3
	66	32	31.6	31.2	30.8	30.4	30	29.4	28.8
67	33.5	33.1	32.7	32.3	31.9	31.5	30.9	30.3	
68	35	34.6	34.2	33.8	33.4	33	32.4	31.8	
69	36	35.6	35.2	34.8	34.4	34	33.5	33	
70	37	36.6	36.2	35.8	35.4	35	34.6	34.2	
71	38.5	38.1	37.7	37.3	36.9	36.5	36.1	35.7	
72	40	39.6	39.2	38.8	38.4	38	37.6	37.2	

Heat Pump Gas Furnace CAZ Superheat Look-up TP Chart Charl

Temp Pres Look-Up Tab

2	Mesured Pressure	424	Interperlated Temp	123.75
3	HP Data point	445	HP Relative Temp	125
4	LP Data Point	417	LP Relative Temp	120
5				
6	F	C	R-22	R-410 A
108	110	50	226.4	364
109	112	51.1	232.8	
110	114	51.7	239.4	
111	115	52.2		390
112	116	53.3	246.1	
113	118	54.4	252.9	
114	120	55.6	259.9	417
115	122	56.7	267	
116	124	57.2	274.3	
117	125	57.8		445
118	126	58.9	281.6	
119	128	60	289.1	
120	130	61.1	296.8	475
121	132	62.2	304.6	
122	134	62.8	312.5	
123	135	63.3		506
124	136	64.4	320.6	
125	138	65.6	328.9	

Change Log Tab

The screenshot displays the Microsoft Excel interface with the following details:

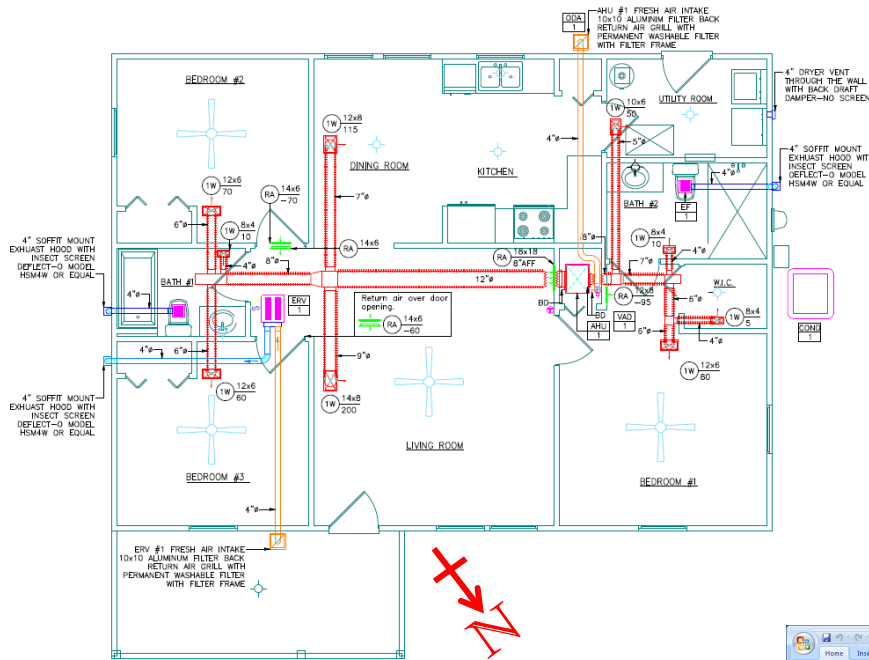
- File Name:** Cx Checklist Residential 2-24-13.xlsx
- Worksheet Name:** Change Log
- Columns:** A, B, C, D, E, F, G, H, I, J, K
- Rows:** 1 through 27
- Content:**
 - Row 2: Change Log
 - Row 3: (Blank)
 - Row 4: Date (under column A), Comment (under column E)
 - Rows 5-27: (Blank)
- Ribbon:** Home, Insert, Page Layout, Formulas, Data, Review, View, Acrobat, PDF-XChange 4
- Formulas Bar:** L16
- Status Bar:** Gas Furnace / CAZ / Superheat Look-up / TP Chart / Change Log

Who Can Commission



Code could indicate who can and who can't open an HVAC system

Lets Play



Scope	Has AED	Net Ton	Rec Ton	ft ² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM
Building		1.30	1.33	927	1,232	11,597	3,987	15,585	15,151	600	600	600
System 1	No	1.30	1.33	927				15,585	15,151	600	600	600
Ventilation						742	2,612		0			
Duct Latent							317					
Zone 1					1,232	10,856	1,800	12,656	15,151	600	600	600
1-Bedroom 1		209	1,406	0	1,406	2,629	104	78	78	78	78	78
2-WIC 1		25	88	0	88	427	17	5	5	5	5	5
3-Bath 2		68	161	0	161	641	25	9	9	9	9	9
4-Utility		68	1,279	200	1,479	1,960	78	71	71	71	71	71
5-Kitchen		108	1,089	1,000	2,089	960	38	60	60	60	60	60
6-Dining Room		108	1,180	0	1,180	1,113	44	65	65	65	65	65
7-Living Room/Bedroom Hall		302	3,209	600	3,809	2,229	88	177	177	177	177	177
8-Bedroom 2		150	1,193	0	1,193	2,330	92	66	66	66	66	66
9-Bath 1		44	122	0	122	532	21	7	7	7	7	7
10-Bedroom 3		150	1,128	0	1,128	2,330	92	62	62	62	62	62

Design Data	
Reference City:	Daytona Beach AP, Florida
Building Orientation:	front door faces Northeast
Daily Temperature Range:	Low
Latitude:	29 Degrees
Elevation:	31 ft.
Altitude Factor:	0.999

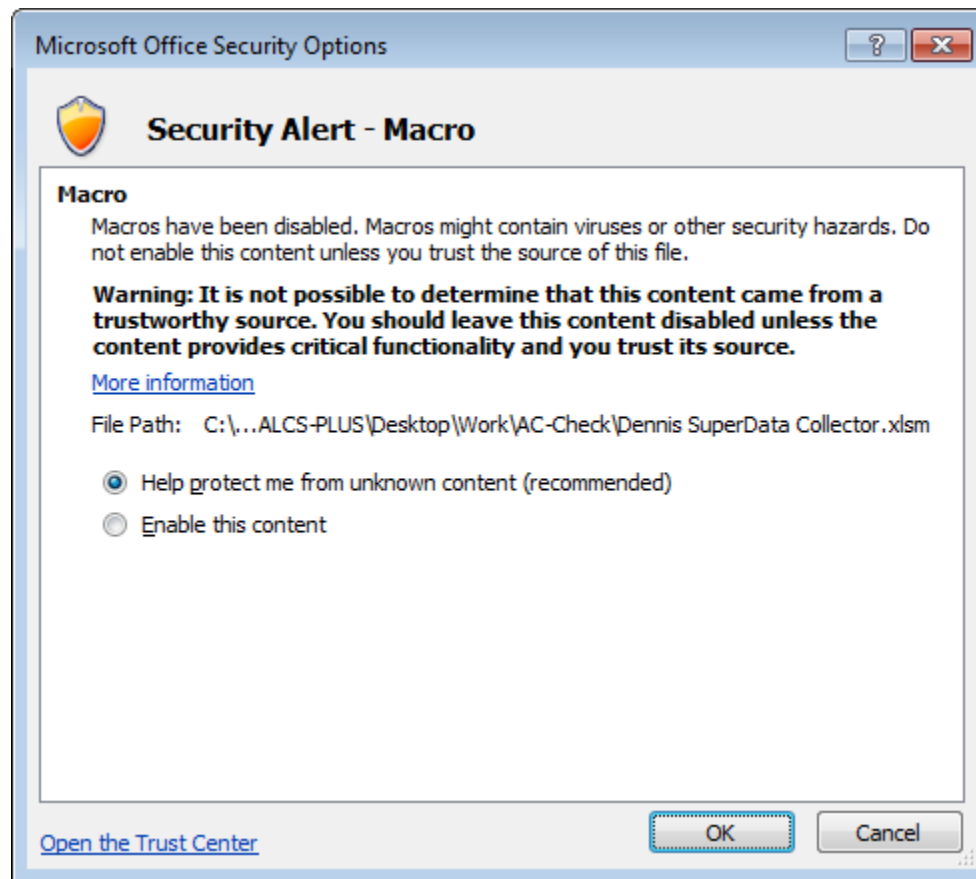
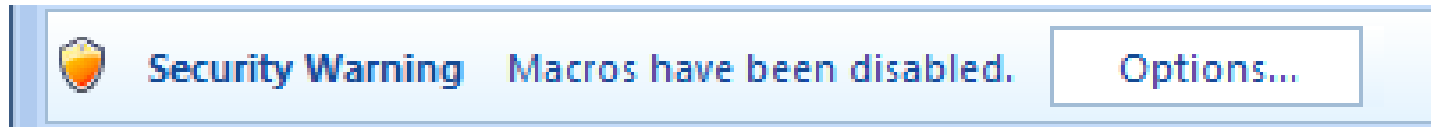
	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	37	34.68	80%	n/a	70	n/a
Summer:	90	77	56%	45%	75	61

Check Figures			
Total Building Supply CFM:	600	CFM Per Square ft.:	0.487
Square ft. of Room Area:	1,232	Square ft. Per Ton:	927
Volume (ft ³) of Cond. Space:	9,985		

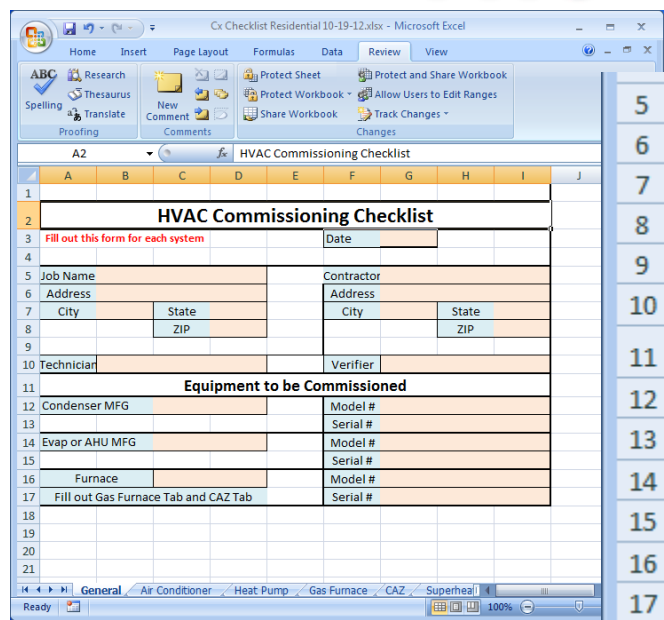
Building Loads		
Total Heating Required Including Ventilation Air:	15,151 Btuh	15.151 MBH
Total Sensible Gain:	11,597 Btuh	74 %
Total Latent Gain:	3,987 Btuh	26 %
Total Cooling Required Including Ventilation Air:	15,585 Btuh	1.30 Tons (Based On Sensible + Latent)
		1.33 Tons (Based On 75% Sensible Capacity)

Microsoft Excel spreadsheet titled "Air Conditioner Commissioning Checklist". The spreadsheet contains a series of numbered rows for data entry, including fields for contractor information, equipment details, and HVAC load calculations. A red 'X' and 'N' are visible in the background of the spreadsheet.

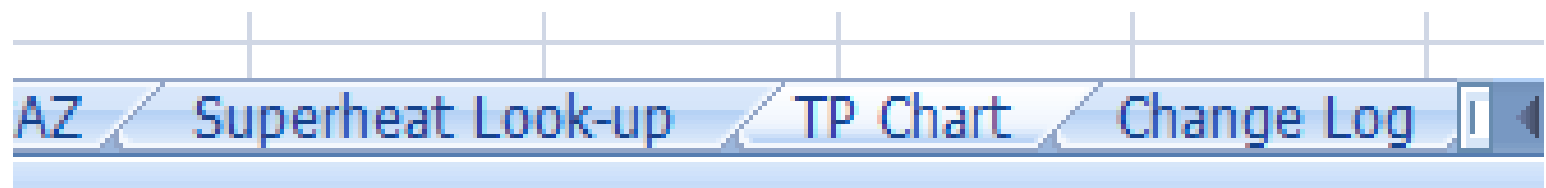
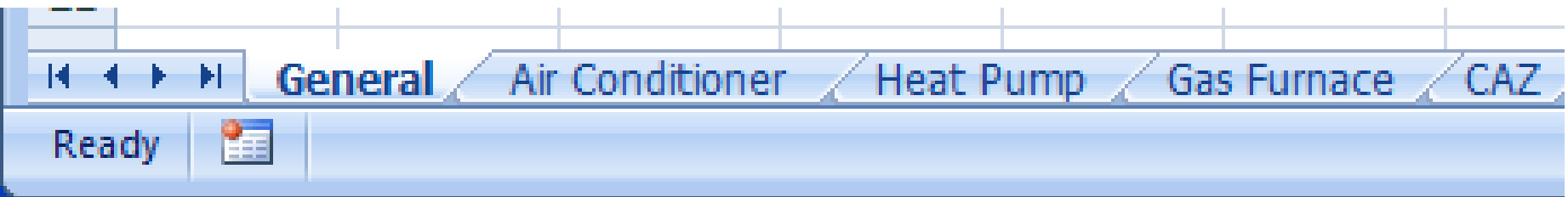
Open the XL Spread Sheet HVAC-Cx-CR3-x-13



The "General" Tab



5	Job Name			Contractor		
6	Address			Address		
7	City	State		City	State	
8		ZIP			ZIP	
9						
10	Technician			Verifier		
11	Equipment to be Commissioned					
12	Condenser MFG			Model #		
13				Serial #		
14	Evap or AHU MFG			Model #		
15				Serial #		
16	Furnace			Model #		
17	Fill out Gas Furnace Tab and CAZ Tab			Serial #		



Record Equipment Model & Serial Numbers

Equipment to be Commissioned					
11					Model #
12	Condenser MFG				Serial #
13					Model #
14	Evap or AHU MFG				Serial #
15					Model #
16	Furnace				Serial #
17	Fill out Gas Furnace Tab and CAZ Tab				



American Standard Inc.
 Manufacturer of Trane & American Standard
 Tyler, Tx 75707

Assembled in USA

TWE065E13FB2	6224JP12V	1.0	7.00	200-230
MODEL NO.	SERIAL NO.	MOTOR H.P.	F.L. AMPS	VOLTS
FACTORY INSTALLED		MAY BE FIELD INSTALLED		

ELECTRIC HEATER - 208 OR 240V, 60Hz, 1PH OR 3PH
 REFRIGERANT 22 ONLY DESIGN PRESSURE 300 PSI
 UNLESS INDICATED "NA" ANY ONE OF THE FOLLOWING HEATERS MAY BE INSTALLED IN THIS UNIT. INSTALLER MUST MARK ONE APPROPRIATE BLOCK IN COLUMN A

A	TRANE HEATER MODEL	SUPPLY VOLTS	PHASE	KW	HEATER AMPS	MIN. BRANCH CIRCUIT CAPACITY	MAXIMUM OVERCURRENT DEVICE	MINIMUM HEATING BLOWER SPEED WITHOUT HEAT PUMP	MINIMUM HEATING BLOWER SPEED WITH HEAT PUMP
	NONE	USE ACC PLATE BAY99X123			8.8	15			
	BAYHTR1405+++	208/240	1	3.60/4.80	17.3/20	30/34	30/35	900	1500
	BAYHTR1408+++	208/240	1	5.76/7.68	27.7/32	43/49	45/50	900	1500
				7.20	34.6	52	60	900	1500

MFR. DATE: 6/2006

08/03/2012

Only if the furnace is natural aspirating; draws combustion air from a CAZ that is in or connected to the home

SERIAL 4911E13607
 PROD 286BNA02400DCAA
 MODEL 286BNA024-C
 METERING TXU 46 PISTON
 DEVICE INDOOR OUTDOOR
 FACTORY CHARGED R410A
 14.00 LBS 6.35 KG
 INDOOR TXU SUB COOLING 9 °F
 POWER SUPPLY 208-230 VOLTS AC
 1 PH 60 HZ
 PERMISSIBLE VOLTAGE AT UNIT
 253 MAX 197 MIN
 SUITABLE FOR OUTDOOR USE
 COMPRESSOR 208/230 VOLTS AC
 1 PH 60 HZ
 12.7 RLA 52.0 LRA
 FAN MOTOR 208/230 VOLTS AC
 1 PH 60 FLA
 1/12 HP 0.5
 DESIGN/TEST PRESSURE GAUGE
 HI 450 PSI 3103 KPA
 LO 250 PSI 1724 KPA
 MAX DESIGN/WORKING PRESSURE
 700 PSIG 4826 KPA
 MINIMUM CIRCUIT AMPS 16 A
 MAX FUSE MAX CKT-BKR(*) 25 A
 25 A
 MODEL NUMBER 286BNA02400DCAA
 SERIAL NUMBER 4911E13607
 DATE OF MANUFACTURE DEC 2011
 04/03/2012
 UL US LISTED
 ENERGY STAR

Ratings and Performance

18	AHRI Certification #		OEM Performance Data Attached Y/N		
19	OEM BTU/h output at		°F Outdoor Temperature		
20	When Indoor conditions are	75°F Dry Bulb	63°F Wet Bulb		
21	Total Output =	Sensible Output=		at	CFM



This combination qualifies for a Federal Energy Efficiency Tax Credit when placed in service between Feb 17, 2009 and Dec 31, 2011.

Certificate of Product Ratings

AHRI Certified Reference Number: 3221035 **Date:** 8/19/2012

Product: Split System: Heat Pump with Remote Outdoor Unit-Air-Source
Outdoor Unit Model Number: 4TW20024A1
Indoor Unit Model Number: 4TEE3C03A1
Manufacturer: TRANE
Trade/Brand name: XL201 WEATHERTRON
Manufacturer responsible for the rating of this system combination is TRANE

Rated as follows in accordance with AHRI Standard 210/240-2008 for Unitary Air-Conditioning and Air-Source Heat Pump Equipment and subject to verification of rating accuracy by AHRI-sponsored, independent, third party testing:

Cooling Capacity (Btu/h):	24200
EER Rating (Cooling):	14.00
SEER Rating (Cooling):	19.00
Heating Capacity(Btu/h) @ 47 F:	21200
Region IV HSPF Rating (Heating):	9.00
Heating Capacity(Btu/h) @ 17 F:	12100



* Ratings followed by an asterisk (*) indicate a voluntary rerate of previously published data, unless accompanied with a WAB, which indicates an involuntary rerate.

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Air-Conditioning, Heating, and Refrigeration Institute

© 2012 Air-Conditioning, Heating, and Refrigeration Institute **CERTIFICATE NO.:** 12969070671403247


DETAILED COOLING CAPACITIES#

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)										
		75 (23.9)			85 (29.4)			95 (35)		105 (40.6)		
		CFM	EWB °F (°C)	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		
Total	Sens‡			Total	Sens‡		Total	Sens‡				
286BNA024-A-HI Outdoor Section With FV4CNF002 Indoor Section												
600	72 (22.2)	27.16	14.15	1.44	25.86	13.63	1.83	24.49	13.06	1.82	23.07	12.47
	67 (19.4)	24.87	16.90	1.42	23.49	16.34	1.80	22.25	15.75	1.80	20.95	15.14
	63 (17.2)††	22.75	16.19	1.41	21.66	15.63	1.59	20.50	15.05	1.78	19.29	14.42
	62 (16.7)	22.41	19.59	1.40	21.34	19.02	1.58	20.21	18.42	1.78	19.02	17.76
	57 (13.9)	21.04	21.04	1.39	20.22	20.22	1.57	19.33	19.33	1.77	18.39	18.39
700	72 (22.2)	26.13	15.04	1.47	26.75	14.46	1.85	25.30	13.86	1.85	23.79	13.24
	67 (19.4)	25.58	18.21	1.45	24.32	17.62	1.83	23.00	17.00	1.83	21.61	16.36
	63 (17.2)††	23.61	17.41	1.43	22.44	16.82	1.61	21.20	16.20	1.61	19.91	15.56
	62 (16.7)	23.27	21.34	1.43	22.13	20.72	1.61	20.94	20.05	1.60	19.70	19.32
735	72 (22.2)	26.43	15.32	1.46	27.01	14.74	1.86	25.54	14.13	1.86	24.00	13.50
	67 (19.4)	25.86	18.85	1.46	24.57	18.05	1.84	23.22	17.42	1.83	21.61	16.77
	63 (17.2)††	23.86	17.82	1.44	22.67	17.22	1.62	21.41	16.58	1.62	20.10	15.93
	62 (16.7)	23.53	21.93	1.44	22.38	21.28	1.62	21.17	20.58	1.61	19.93	19.81
800	72 (22.2)	26.91	15.83	1.49	27.45	15.23	1.87	25.93	14.61	1.87	24.35	13.97
	67 (19.4)	26.31	19.45	1.47	24.98	18.63	1.85	23.59	18.19	1.85	22.13	17.52
	63 (17.2)††	24.28	18.56	1.45	23.05	17.94	1.83	21.75	17.30	1.83	20.40	16.63
	62 (16.7)	23.98	22.97	1.45	22.80	22.27	1.83	21.58	21.51	1.83	20.35	20.35
	57 (13.9)	23.44	23.44	1.44	22.48	22.48	1.83	21.42	21.42	1.83	20.31	20.31

Ratings and Performance

18	AHRI Certification #	3221035	OEM Performance Data Attached Y/N	
19	OEM BTU/h output at		°F Outdoor Temperature	
20	When Indoor conditions are	75°F Dry Bulb	63°F Wet Bulb	
21	Total Output =	Sensible Output=	at	CFM

AHRI Certified Reference Number: 3221035



This combination qualifies for a Federal Energy Efficiency Tax Credit when placed in service between Feb 17, 2009 and Dec 31, 2011.

Certificate of Product Ratings

AHRI Certified Reference Number: 3221035 Date: 8/19/2012

Product: Split System: Heat Pump with Remote Outdoor Unit-Air-Source
Outdoor Unit Model Number: 4TWZ0024A1
Indoor Unit Model Number: 4TEE3C03A1
Manufacturer: TRANE
Trade/Brand name: XL201 WEATHERTRON

Manufacturer responsible for the rating of this system combination is TRANE

Rated as follows in accordance with AHRI Standard 210/240-2008 for Unitary Air-Conditioning and Air-Source Heat Pump Equipment and subject to verification of rating accuracy by AHRI-sponsored, independent, third party testing:


Cooling Capacity (Btuh):	24200
EER Rating (Cooling):	14.00
SEER Rating (Cooling):	19.00
Heating Capacity(Btuh) @ 47 F:	21200
Region IV HSPF Rating (Heating):	9.00
Heating Capacity(Btuh) @ 17 F:	12100

* Ratings followed by an asterisk (*) indicate a voluntary rerate of previously published data, unless accompanied with a VAS, which indicates an involuntary rerate.

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Air-Conditioning, Heating, and Refrigeration Institute

CERTIFICATE NO.: 129898706701403247

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Cooling Capacity (Btuh): 24200

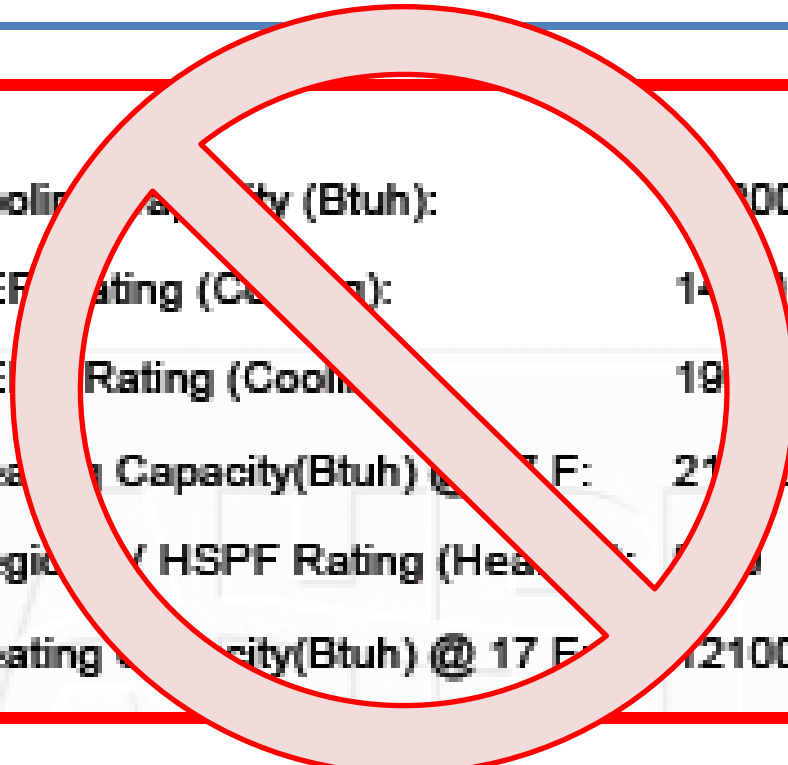
EER Rating (Cooling): 14.00

SEER Rating (Cooling): 19.00

Heating Capacity(Btuh) @ 47 F: 21200

Region IV HSPF Rating (Heating): 9.00

Heating Capacity(Btuh) @ 17 F: 12100



OEM Expanded Performance Tables

DETAILED COOLING CAPACITIES#

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)										
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)	
		CFM	EWB °F (°C)	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Capacity MBtu/h†
Total	Sens‡			Total	Sens‡		Total	Sens‡		Total	Sens‡	
286BNA024—A—HI Outdoor Section With FV4CNF002 Indoor Section												
600	72 (22.2)	27.16	14.15	1.44	25.86	13.63	1.83	24.49	13.06	1.82	23.07	12.47
	67 (19.4)	24.67	16.90	1.42	23.49	16.34	1.80	22.25	15.75	1.80	20.95	15.14
	63 (17.2)††	22.75	16.19	1.41	21.66	15.63	1.59	20.50	15.05	1.78	19.29	14.42
	62 (16.7)	22.41	19.59	1.40	21.34	19.02	1.58	20.21	18.42	1.78	19.02	17.76
	57 (13.9)	21.04	21.04	1.39	20.22	20.22	1.57	19.33	19.33	1.77	18.39	18.39
700	72 (22.2)	26.13	15.04	1.47	26.75	14.46	1.85	25.30	13.86	1.85	23.79	13.24
	67 (19.4)	25.56	18.21	1.45	24.32	17.62	1.83	23.00	17.00	1.83	21.61	16.36
	63 (17.2)††	23.61	17.41	1.43	22.44	16.62	1.61	21.20	16.20	1.61	19.91	15.56
	62 (16.7)	23.27	21.34	1.43	22.13	20.72	1.61	20.94	20.05	1.80	19.70	19.32
	57 (13.9)	22.33	22.33	1.42	21.43	21.43	1.60	20.46	20.46	1.80	19.43	19.43
735	72 (22.2)	26.43	15.32	1.48	27.01	14.74	1.86	25.54	14.13	1.86	24.00	13.50
	67 (19.4)	25.86	18.65	1.46	24.57	18.05	1.84	23.22	17.42	1.83	21.81	16.77
	63 (17.2)††	23.86	17.82	1.44	22.87	17.22	1.62	21.41	16.56	1.82	20.10	15.93
	62 (16.7)	23.53	21.93	1.44	22.38	21.26	1.62	21.17	20.56	1.81	19.93	19.81
	57 (13.9)	22.74	22.74	1.43	21.80	21.80	1.61	20.81	20.81	1.81	19.78	19.78
800	72 (22.2)	26.91	15.83	1.49	27.45	15.23	1.87	25.93	14.61	1.87	24.35	13.97
	67 (19.4)	26.31	19.45	1.47	24.98	18.63	1.85	23.59	18.19	1.85	22.13	17.52
	63 (17.2)††	24.26	18.56	1.45	23.05	17.94	1.63	21.75	17.30	1.83	20.40	16.83

COMBINATION RATINGS



AHRI Ref. No.	Model Number	Coil Model Number	Furnace Model Number	Cooling Capacity		Cooling		
				High	Low	EER	SEER	ID
								High
3748472	286BNA024****A	†FV4CNF002		23,000	18,600	12.6	16.0	700
3748498	286BNA024****A	FE4AN(B,F)003+UI		23,800	19,400	13.0	16.5	800
3748497	286BNA024****A	FE4ANF002+UI		23,800	19,400	12.7	16.5	800
3748505	286BNA024****A	CAP**2414A**	313*AV024045	23,000	18,800	12.3	15.5	710

OEM Expanded Performance Tables

DETAILED COOLING CAPACITIES#

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)										
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)	
CFM	EWB °F (°C)	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†	
		Total	Sens‡		Total	Sens‡		Total	Sens‡		Total	Sens‡
286BNA024-A-HI Outdoor Section With FV4CNF002 Indoor Section												
600	72 (22.2)	27.16	14.15	1.44	25.86	13.63	1.83	24.49	12.71	1.82	23.07	12.47
	67 (19.4)	24.67	16.90	1.42	23.49	16.34	1.80	22.25	15.75	1.80	20.95	15.14
	63 (17.2)††	22.75	16.19	1.41	21.66	15.63	1.59	20.50	15.05	1.78	19.29	14.42
	62 (16.7)	22.41	19.59	1.40	21.34	19.02	1.58	20.21	18.42	1.78	19.02	17.76
	57 (13.9)	21.04	21.04	1.39	20.22	20.22	1.57	19.33	19.33	1.77	18.39	18.39
700	72 (22.2)	26.13	15.04	1.47	26.75	14.46	1.65	25.30	13.96	1.85	23.79	13.24
	67 (19.4)	25.56	18.21	1.45	24.32	17.62	1.63	23.00	17.00	1.83	21.61	16.36
	63 (17.2)††	23.61	17.41	1.43	22.44	16.62	1.61	21.20	16.20	1.81	19.91	15.56
	62 (16.7)	23.27	21.34	1.43	22.13	20.72	1.61	20.94	20.05	1.80	19.70	19.32
	57 (13.9)	22.33	22.33	1.42	21.43	21.43	1.60	20.46	20.46	1.80	19.43	19.43
735	72 (22.2)	26.43	15.32	1.48	27.01	14.74	1.66	25.54	14.33	1.86	24.00	13.50
	67 (19.4)	25.86	18.65	1.46	24.57	18.05	1.64	23.22	17.42	1.83	21.81	16.77
	63 (17.2)††	23.86	17.82	1.44	22.67	17.22	1.62	21.41	16.56	1.82	20.10	15.93
	62 (16.7)	23.53	21.93	1.44	22.38	21.26	1.62	21.17	20.35	1.81	19.93	19.81
	57 (13.9)	22.74	22.74	1.43	21.80	21.80	1.61	20.81	20.81	1.81	19.78	19.78
800	72 (22.2)	28.91	15.83	1.49	27.45	15.23	1.67	25.93	14.61	1.87	24.35	13.97
	67 (19.4)	26.31	19.45	1.47	24.98	18.63	1.65	23.59	18.19	1.85	22.13	17.52
	63 (17.2)††	24.22	18.22	1.45	22.32	17.91	1.63	21.75	17.30	1.83	20.40	16.83
	62 (16.7)	23.96	22.97	1.45	22.80	22.27	1.63	21.58	21.51	1.83	20.35	20.35
	57 (13.9)	23.44	23.44	1.44	22.46	22.46	1.63	21.42	21.42	1.83	20.31	20.31

OEM Expanded Performance Tables

DETAILED COOLING CAPACITIES#

EVAPORATOR AIR		95 (35)			CONDENSER AIR °F (°C)
75 (23.9)					105 (40.6)
EVAPORATOR AIR		Capacity MBtuht		Total System KW**	EER
CFM	EWB °F (°C)	Total	Sens†		
700	72 (22.2)	25.93	14.81	1.87	12.47
	67 (19.4)	23.58	18.19	1.85	15.14
	800	63 (17.2)††	21.75	17.30	14.42
	62 (18.7)	21.58	21.51	1.83	17.78
	57 (13.8)	21.42	21.42	1.83	18.39
750					13.24
					16.36
					15.56
800					19.32
					18.43
					13.50
850					16.77
					15.93
					19.81
900					19.78
					13.97
					17.52
950					16.83

COMBINATION RATINGS



AHRI Ref. No.	Model Number	Coil Model Number	Furnace Model Number	Cooling Capacity		Cooling		
				High	Low	EER	SEER	ID
								High
3748472	286BNA024****A	†FV4CNF002		23,000	18,600	12.6	16.0	700
3748498	286BNA024****A	FE4AN(B,F)003+UI		23,800	19,400	13.0	16.5	800
3748497	286BNA024****A	FE4ANF002+UI		23,800	19,400	12.7	16.5	800
3748505	286BNA024****A	CAP**2414A**	313*AV024045	23,000	18,800	12.3	15.5	710

OEM Expanded Performance Tables

DETAILED COOLING CAPACITIES#

EVAPORATOR AIR		95 (35)			CONDENSER AIR °F (°C)	
75 (23.9)					105 (40.6)	
EVAPORATOR AIR		Capacity MBtu/h†		Total System KW**	MBtu/h†	
CFM	EWB °F (°C)	Total	Sens†		Sens†	
700	72 (22.2)	25.93	14.81	1.87	12.47	
	87 (19.4)	23.59	18.19	1.85	15.14	
	800	63 (17.2)††	21.75	17.30	1.83	14.42
	82 (18.7)	21.58	21.51	1.83	17.78	
	57 (13.8)	21.42	21.42	1.83	18.39	
750	72 (22.2)	25.93	14.81	1.87	13.24	
	87 (19.4)	23.59	18.19	1.85	16.36	
	800	63 (17.2)††	21.75	17.30	1.83	15.56
800	82 (18.7)	21.58	21.51	1.83	19.32	
	87 (19.4)	23.59	18.19	1.85	19.43	
	92 (20.0)	23.42	18.02	1.85	13.50	
850	87 (19.4)	23.59	18.19	1.85	16.77	
	92 (20.0)	23.42	18.02	1.85	15.93	
	97 (20.6)	23.25	17.85	1.85	19.81	
900	92 (20.0)	23.42	18.02	1.85	19.78	
	97 (20.6)	23.25	17.85	1.85	13.97	
	102 (21.1)	23.08	17.68	1.85	17.52	
950	97 (20.6)	23.25	17.85	1.85	18.83	
	102 (21.1)	23.08	17.68	1.85	18.83	
	107 (21.7)	22.91	17.51	1.85	18.83	

COMBINATION RATINGS

AHRI Ref. No.	Model Number	Coil Model Number	Furnace Model Number	Cooling Capacity		Cooling		
				High	Low	EER	SEER	ID
								High
3748472	286BNA024****A	†FV4CNF002		23,000	18,600	12.6	16.0	700
3748498	286BNA024****A	FE4AN(B,F)003+UI		23,800	19,400	13.0	16.5	800
3748497	286BNA024****A	FE4ANF002+UI		23,800	19,400	12.7	16.5	800
3748505	286BNA024****A	CAP**2414A**	313*AV024045	23,000	18,800	12.3	15.5	710

OEM Expanded Performance Tables

DETAILED COOLING CAPACITIES#

EVAPORATOR AIR		CONDENSER ENTERING AIR TEMPERATURES °F (°C)											
		75 (23.9)			85 (29.4)			95 (35)			105 (40.6)		
		CFM	EWB °F (°C)	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†		Total System KW**	Capacity MBtu/h†
Total	Sens‡			Total	Sens‡		Total	Sens‡		Total	Sens‡		
286BNA024-A-HI Outdoor Section With FV4CNF-002 Indoor Section													
600	72 (22.2)	27.16	14.15	1.44	25.66	13.63	1.83	24.49	12.10	1.82	23.07	12.47	
	67 (19.4)	24.67	16.90	1.42	23.49	16.34	1.80	22.25	15.75	1.80	20.95	15.14	
	63 (17.2)††	22.75	16.19	1.41	21.66	15.63	1.59	20.50	15.05	1.78	19.29	14.42	
	62 (16.7)	22.41	19.59	1.40	21.34	19.02	1.58	20.21	18.42	1.78	19.02	17.78	
18	AHRI Certification #		3221035			OEM Performance Data Attached Y/N							
19	OEM BTU/h output at			95 °F Outdoor Temperature									
20	When Indoor conditions are			75°F Dry Bulb			63°F Wet Bulb						
21	Total Output =		21,750		Sensible Output=		17,300		at		800 CFM		
735	63 (17.2)††	23.86	17.82	1.44	22.67	17.22	1.82	21.41	16.56	1.82	20.10	15.93	
	62 (16.7)	23.53	21.93	1.44	22.38	21.26	1.82	21.17	20.51	1.81	19.93	19.81	
	57 (13.9)	22.74	22.74	1.43	21.80	21.80	1.81	20.81	20.81	1.81	19.78	19.78	
800	72 (22.2)	28.91	15.83	1.49	27.45	15.23	1.87	25.93	14.81	1.87	24.35	13.97	
	67 (19.4)	26.31	19.45	1.47	24.98	18.63	1.85	23.59	18.19	1.85	22.13	17.52	
	63 (17.2)††	24.26	18.55	1.45	23.33	17.91	1.83	21.75	17.30	1.83	20.40	16.83	
	62 (16.7)	23.96	22.97	1.45	22.80	22.27	1.83	21.58	21.51	1.83	20.35	20.35	
	57 (13.9)	23.44	23.44	1.44	22.46	22.46	1.83	21.42	21.42	1.83	20.31	20.31	

Verifying HVAC Load Calculation

23	HVAC Load Calculations (for new construction, must be room by room calculation)		Heating 98% DB	Cooling 1% DB	Coincident Wet Bulb	Design Grains Diff	Daily Range	Calcs Attached Y/N
24	Outdoor Conditions			90	77	61	Low	Yes
25	Net Heat Gain =	15585	Sens =	11597	Heat Loss =			
26	Design Airflow =	0 CFM						

Design Data

Reference City: Daytona Beach AP, Florida
 Building Orientation: front door faces Northeast
 Daily Temperature Range: Low
 Latitude: 29 Degrees
 Elevation: 31 ft.
 Altitude Factor: 0.999

	<u>Outdoor Dry Bulb</u>	<u>Outdoor Wet Bulb</u>	<u>Outdoor Rel.Hum</u>	<u>Indoor Rel.Hum</u>	<u>Indoor Dry Bulb</u>	<u>Grains Difference</u>
Winter:	37	34.68	80%	n/a	70	n/a
Summer:	<u>90</u>	<u>77</u>	56%	45%	75	<u>61</u>

Check Figures

Total Building Supply CFM:	600	CFM Per Square ft.:	0.487
Square ft. of Room Area:	1,232	Square ft. Per Ton:	927
Volume (ft ³) of Cond. Space:	9,985		

Building Loads

Total Heating Required Including Ventilation Air:	15,151 Btuh	15.151 MBH
Total Sensible Gain:	11,597 Btuh	74 %
Total Latent Gain:	3,987 Btuh	26 %
Total Cooling Required Including Ventilation Air:	<u>15,585 Btuh</u>	1.30 Tons (Based On Sensible + Latent)
		1.33 Tons (Based On 75% Sensible Capacity)

Verifying HVAC Load Calculation

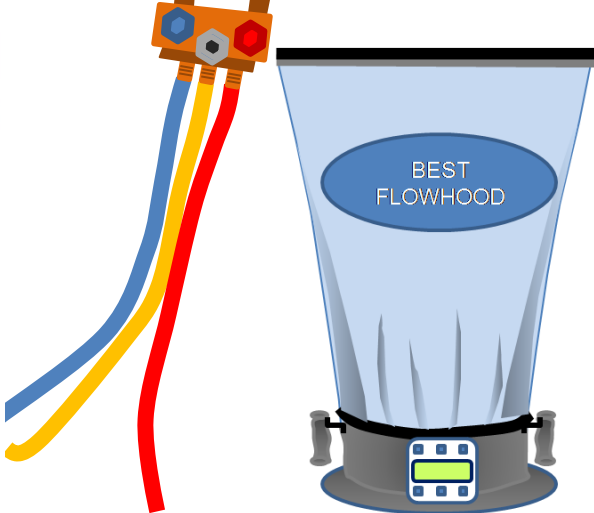
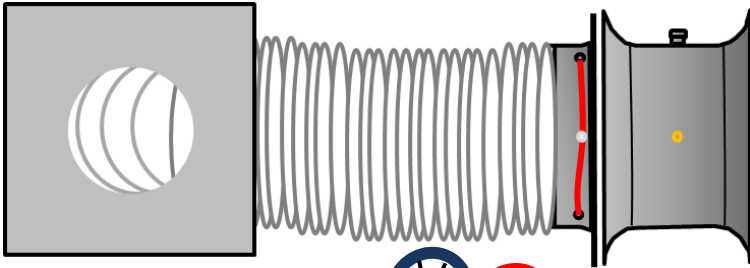
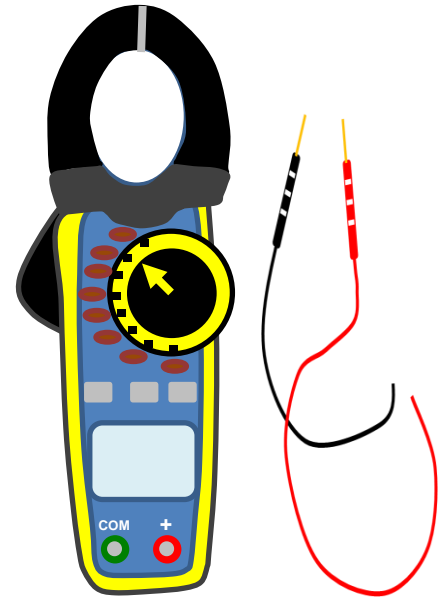
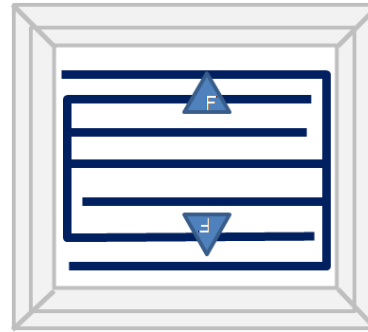
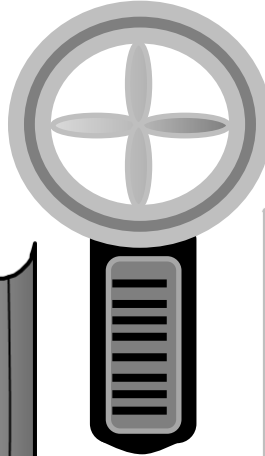
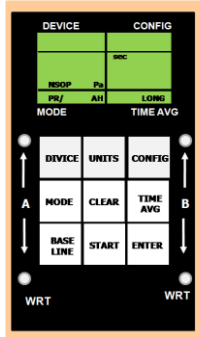
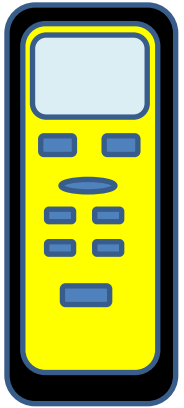
23	HVAC Load Calculations (for new construction, must be room by room calculation)	Heating 98% DB	Cooling 1% DB	Coincident Wet Bulb	Design Grains Diff	Daily Range	Calcs Attached Y/N
24	Outdoor Conditions		90	77	61	Low	Yes
25	Net Heat Gain =	15585	Sens =	11597	Heat Loss =		
26	Design Airflow =	600	0 CFM				

Load Preview

Show Min Flow | Show Net Ton | Show Rec Ton | Show AED Status | Show Duct Size

Scope	Has AED	Net Ton	Rec Ton	ft. ² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM
Building		1.30	1.33	927	1,232	11,597	3,987	15,585	15,151	600	600	600
System 1	No	1.30	1.33	927	1,232	11,597	3,987	15,585	15,151	600	600	600
Ventilation						742	1,870	2,612	0			
Duct Latent							317	317				
Zone 1					1,232	10,856	1,800	12,656	15,151	600	600	600
1-Bedroom 1					209	1,406	0	1,406	2,629	104	78	78
2-WIC 1					25	88	0	88	427	17	5	5
3-Bath 2					68	161	0	161	641	25	9	9
4-Utility					68	1,279	200	1,479	1,960	78	71	71
5-Kitchen					108	1,089	1,000	2,089	960	38	60	60
6-Dining Room					108	1,180	0	1,180	1,113	44	65	65
7-Living Room/Bedroom Hall					302	3,209	600	3,809	2,229	88	177	177
8-Bedroom 2					150	1,193	0	1,193	2,330	92	66	66
9-Bath 1					44	122	0	122	532	21	7	7
10-Bedroom 3					150	1,128	0	1,128	2,330	92	62	62

Data Collection



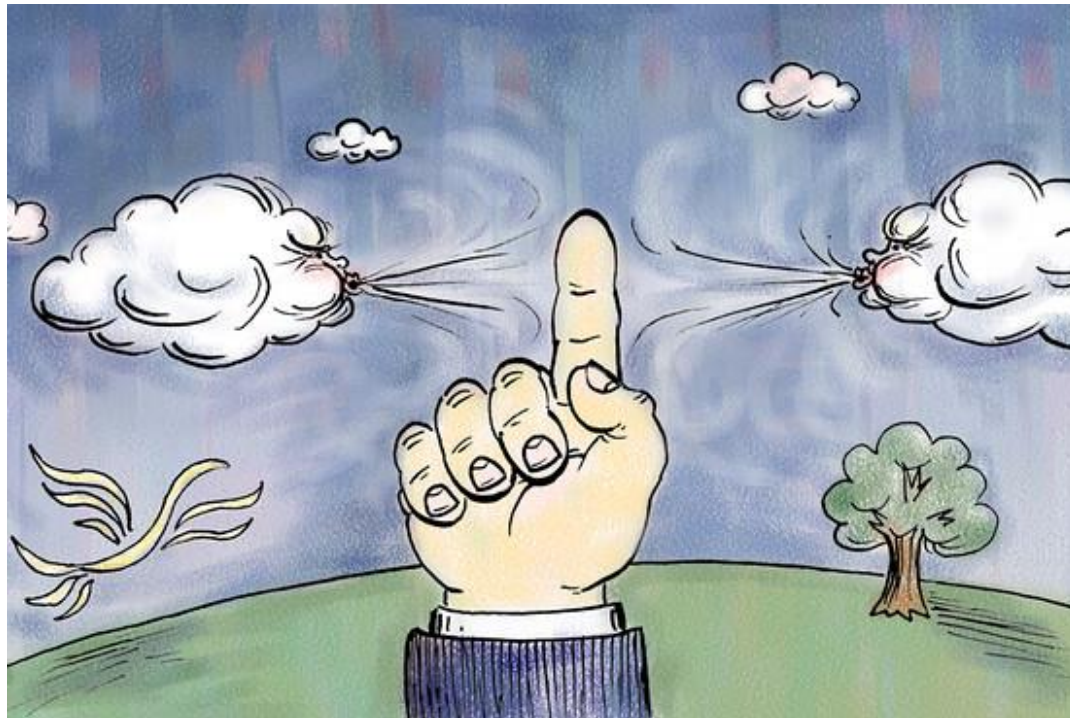
CALCS-PLUS

Air Flow

Indoor Section

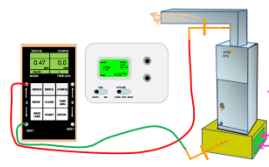
29					
30	Airflow at Evap Coil	CFM	ODA Intake	CFM	
31	Measurement Method				
32	Fan Speed Setting	FLA	RLA	Voltage	
33	RA Plenum Static Pressure IWC		SA Plenum Static Pressure IWC		

How you going to measure?



Air Flow

29	Indoor Section			
30	Airflow at Evap Coil	CFM	ODA Intake	CFM
31	Measurement Method			
32	Fan Speed Setting	FLA	RLA	Voltage
33	RA Plenum Static Pressure IWC		SA Plenum Static Pressure IWC	



EXTERNAL STATIC PRESSURE (in-w.g.)	AIRFLOW CFM					
	VERTICAL		VERTICAL		HORIZONTAL	
	20' HGT.	20' HGT.	20' HGT.	20' HGT.	20' HGT.	20' HGT.
	IN	MED	LO	IN	MED	LO
0	1484	1282	1077	1402	1209	983
0.1	1453	1248	1048	1374	1181	955
0.2	1344	1128	930	1250	1054	838
0.3	1277	1071	871	1227	1030	812
0.4	1209	1015	815	1193	985	785
0.5	1139	958	758	1160	952	752
0.6	1065	897	697	1131	915	715
0.7	989	834	634	1104	888	688
0.8	917	777	577	1079	864	664
0.9	842	720	520	1057	833	633



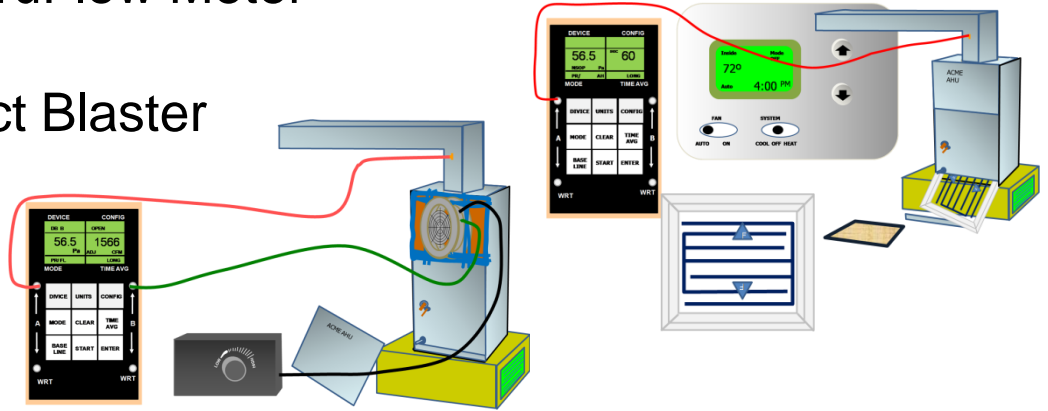
OEM = OEM CFM/static pressure drop coil Table
Attach Table to this document

TV = Using a manometer and tube or an anemometer (hot wire or rotary style) to traverse an airway

FG = Flow Grid or Flow Plate i.e. TruFlow Meter

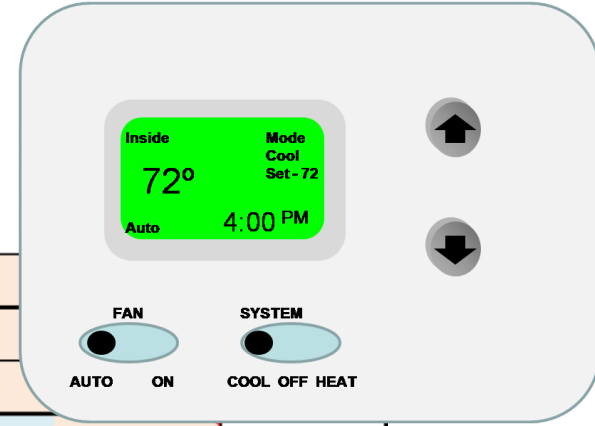
PM = Pressure Matching using Duct Blaster

O = Other - define



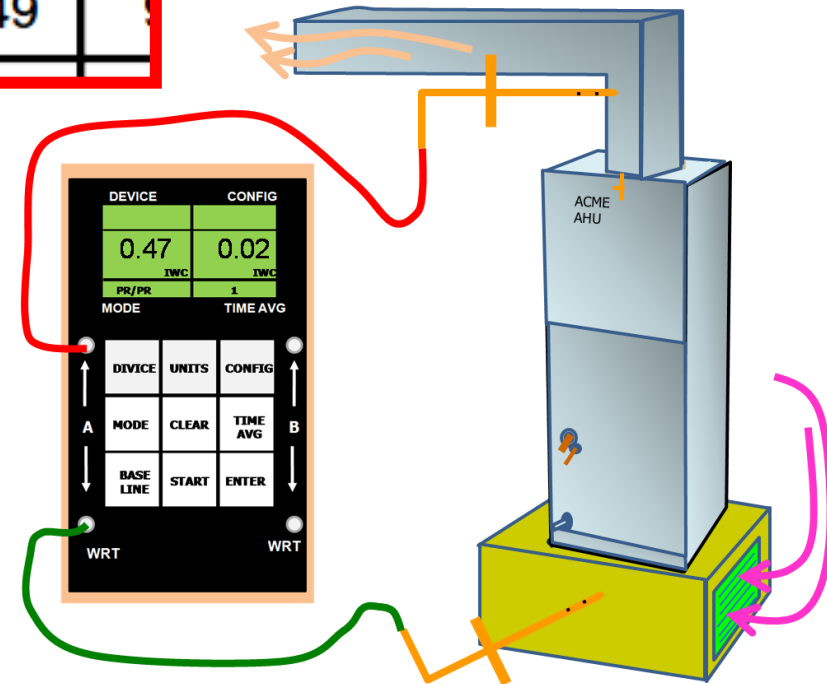
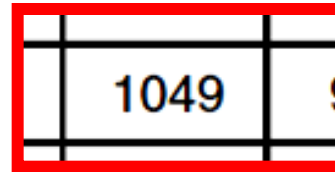
OEM = OEM CFM/static pressure drop coil Table

Attach Table to this document



Indoor Section	
29	
30	Airflow at Evap Coil 1049 CFM ODA Intake
31	Measurement Method OEM
32	Fan Speed Setting MED FLA RLA
33	RA Plenum Static Pressure IWC SA Plenum Static Pressure IWC

Airflow Performance 2/4TEC3F36B: Wet coil, No Heaters									
EXTERNAL STATIC PRESSURE (in.w.g.)	AIRFLOW (CFM)								
	VERTICAL						HORIZ		
	230 VOLTS			208 VOLTS			230 VOLTS		
	HI	MED	LO	HI	MED	LO	HI	MED	LO
0	1484	1282	1077	1402	1200	963	1402	1265	1069
0.1	1412	1268	1082	1352	1166	948	1350	1228	1048
0.2	1344	1226	1055	1292	1130	924	1289	1180	1015
0.3	1277	1171	1013	1227	1089	893	1225	1127	976
0.4	1209	1110	965	1163	1040	856	1163	1073	933
0.5	1139	1049	915	1098	982	814	1104	1019	887
0.6	1065	987	862	1031	915	764	1043	962	835
0.7	988	916	799	957	839	703	977	897	771
0.8	907	827	713	870	757	624	894	815	689
0.9	823	702	584	760	671	521	783	707	579



NOTES: With filter, no horizontal drip tray
Small apex baffle
Subtract 0.06" W.G. for downflow

As shipped exce
Subtract 0.05" W.G.

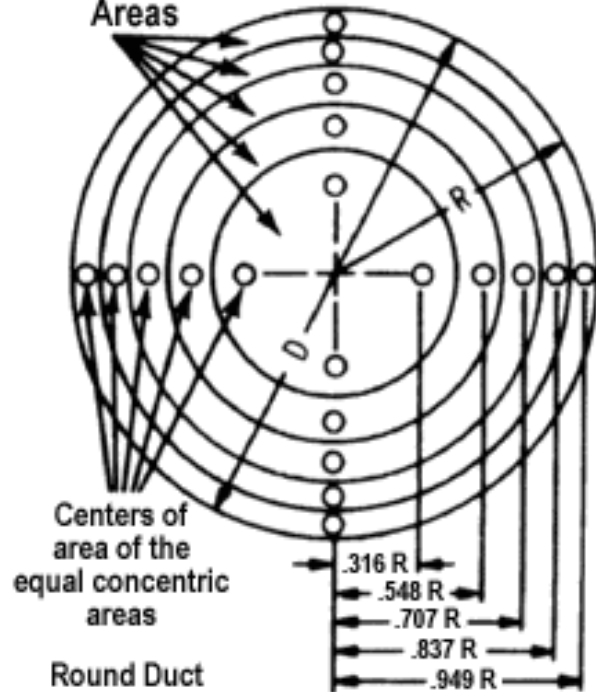
TV = Using a manometer and tube or a anemometer (hot wire or rotary style) to traverse an airway

29

Indoor Section

30	Airflow at Evap Coil	1150	CFM	ODA Intake	CFM
31	Measurement Method	TV			
32	Fan Speed Setting	MED	FLA	RLA	Voltage
33	RA Plenum Static Pressure IWC			SA Plenum Static Pressure IWC	

Equal Concentric Areas



Pitot Tube Stations Indicated by O

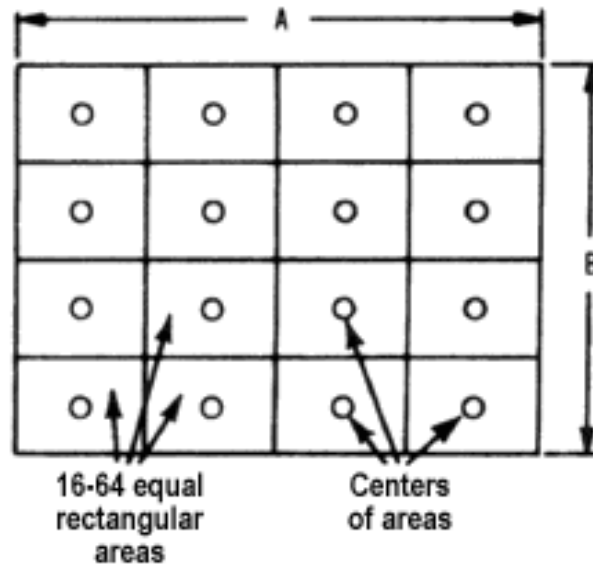
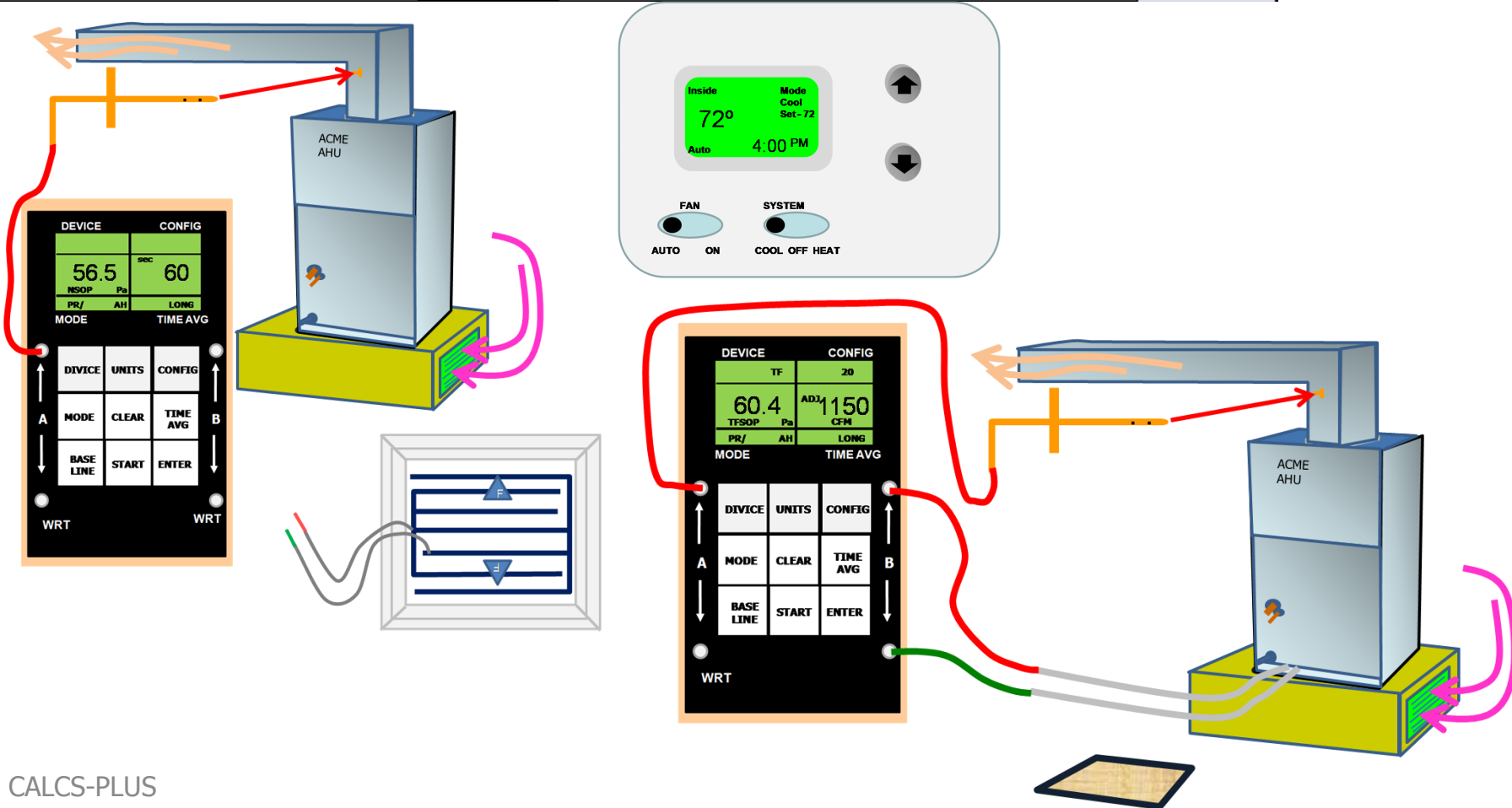


Fig. 4 – Traverse on round and square duct areas



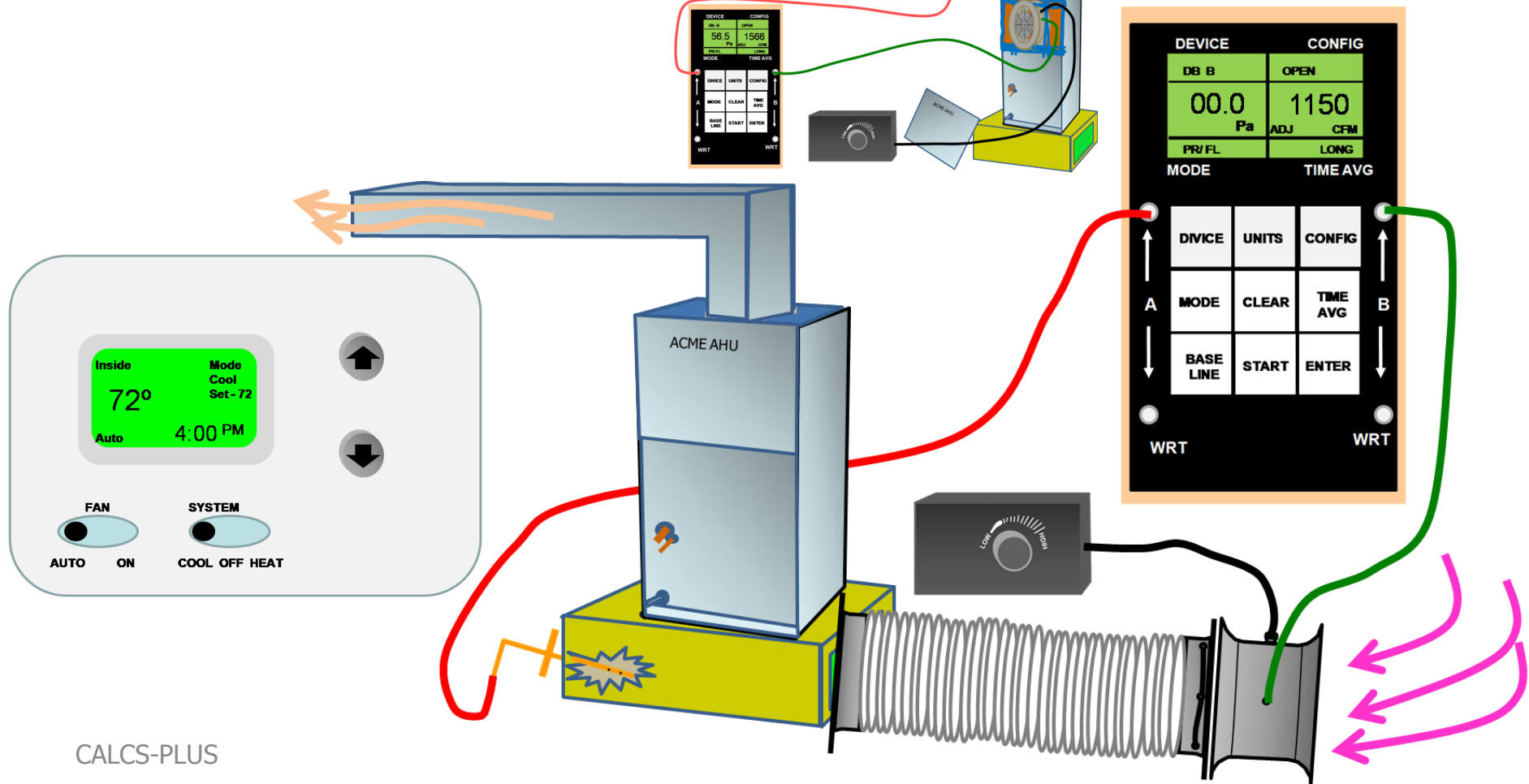
FG = Flow Grid or Flow Plate i.e. TruFlow Meter

Indoor Section						
30	Airflow at Evap Coil	1150	CFM	ODA Intake	CFM	
31	Measurement Method	FG				
32	Fan Speed Setting	MED	FLA	RLA	Voltage	
33	RA Plenum Static Pressure IWC			SA Plenum Static Pressure IWC		



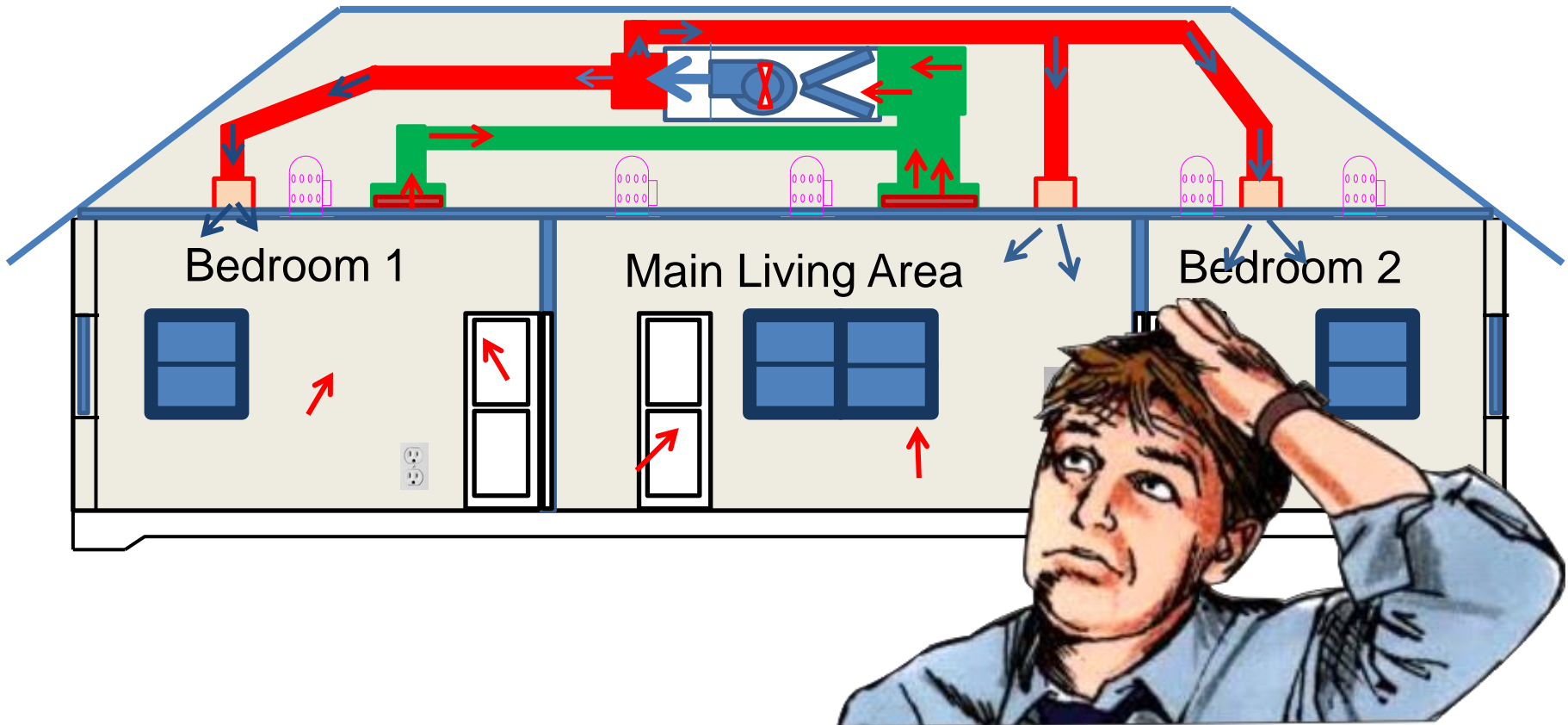
PM = Pressure Matching using Duct Blaster

Indoor Section					
30	Airflow at Evap Coil	1150	CFM	ODA Intake	CFM
31	Measurement Method	PM			
32	Fan Speed Setting	MED	FLA	RLA	Voltage
33	RA Plenum Static Pressure IWC			SA Plenum Static Pressure IWC	



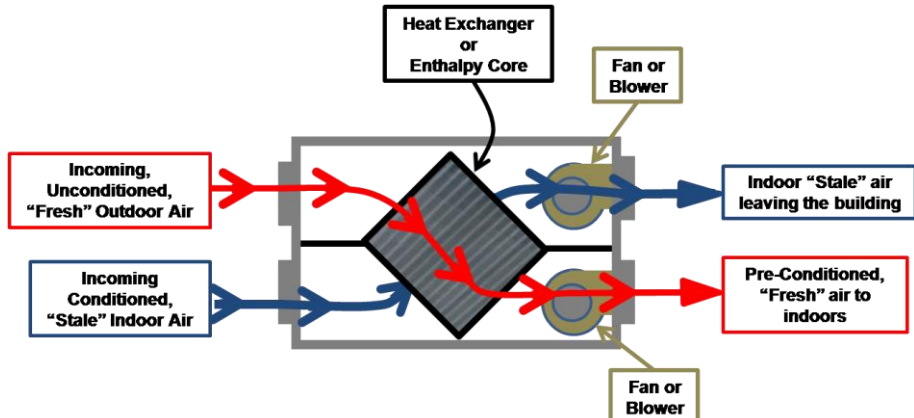
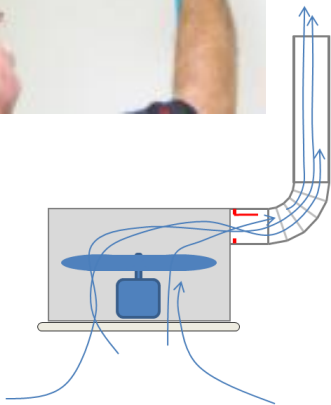
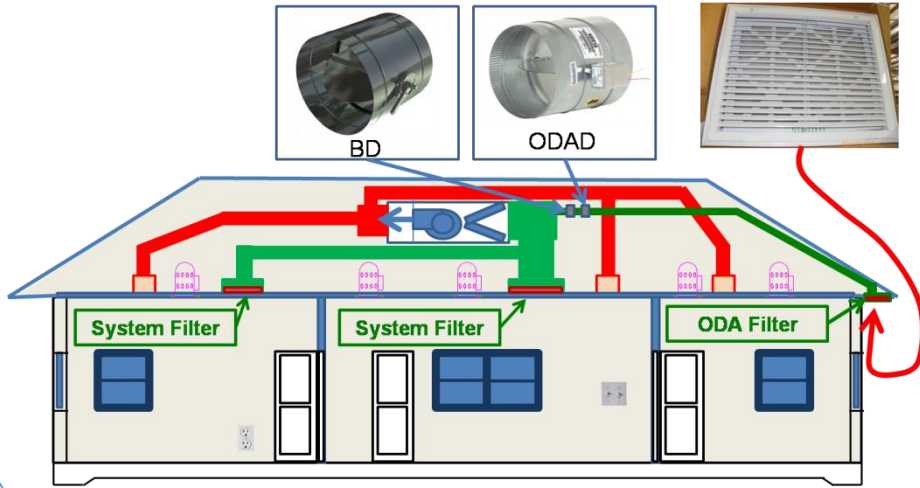
O = Other - Define

29	Indoor Section					
30	Airflow at Evap Coil	?	CFM	ODA Intake	CFM	
31	Measurement Method	O Please Explain!				
32	Fan Speed Setting	MED	FLA	RLA	Voltage	
33	RA Plenum Static Pressure IWC			SA Plenum Static Pressure IWC		



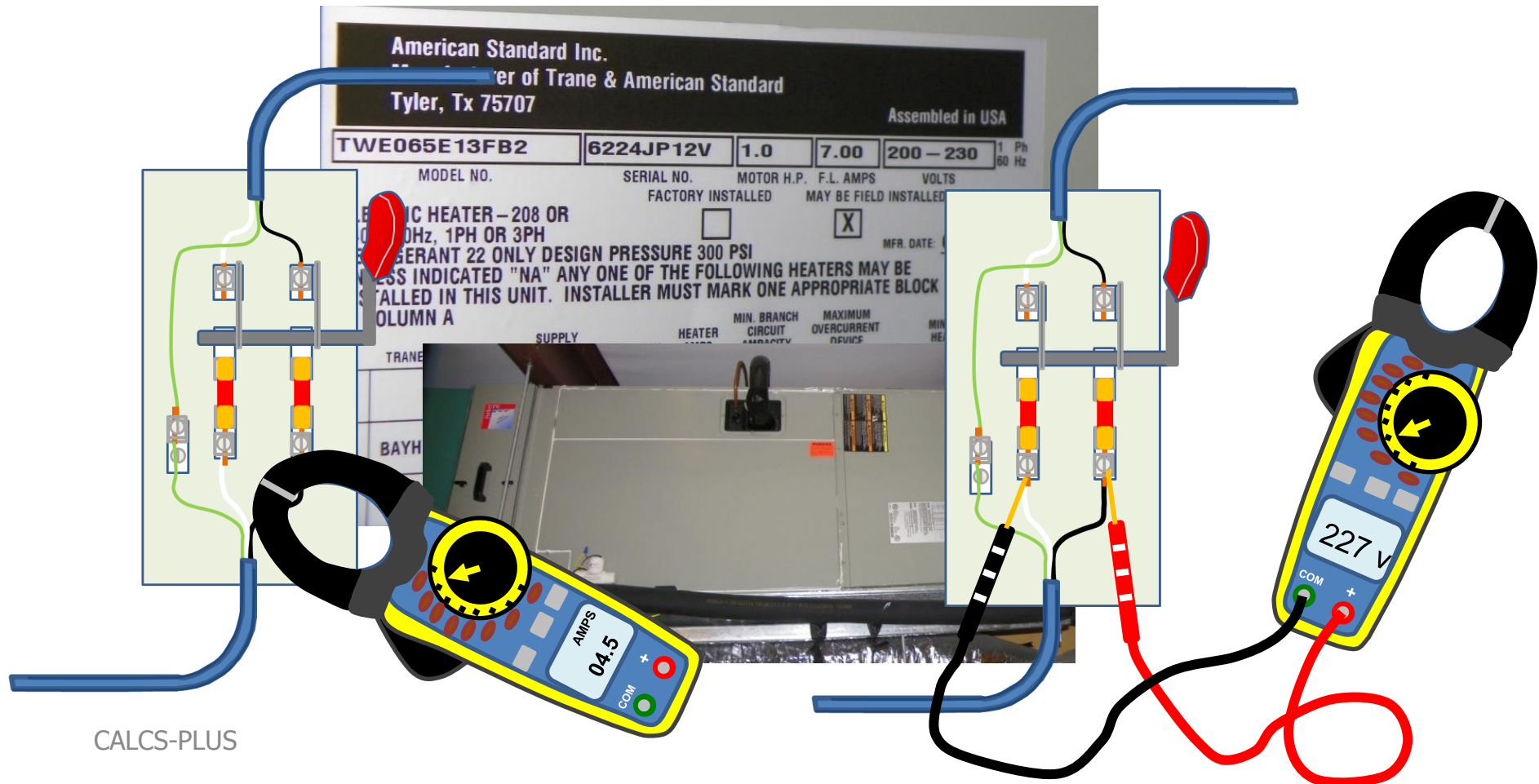
Outdoor Air

29	Indoor Section				
30	Airflow at Evap Coil	CFM	ODA Intake	CFM	
31	Measurement Method				
32	Fan Speed Setting	FLA	RLA	Voltage	
33	RA Plenum Static Pressure IWC		SA Plenum Static Pressure IWC		



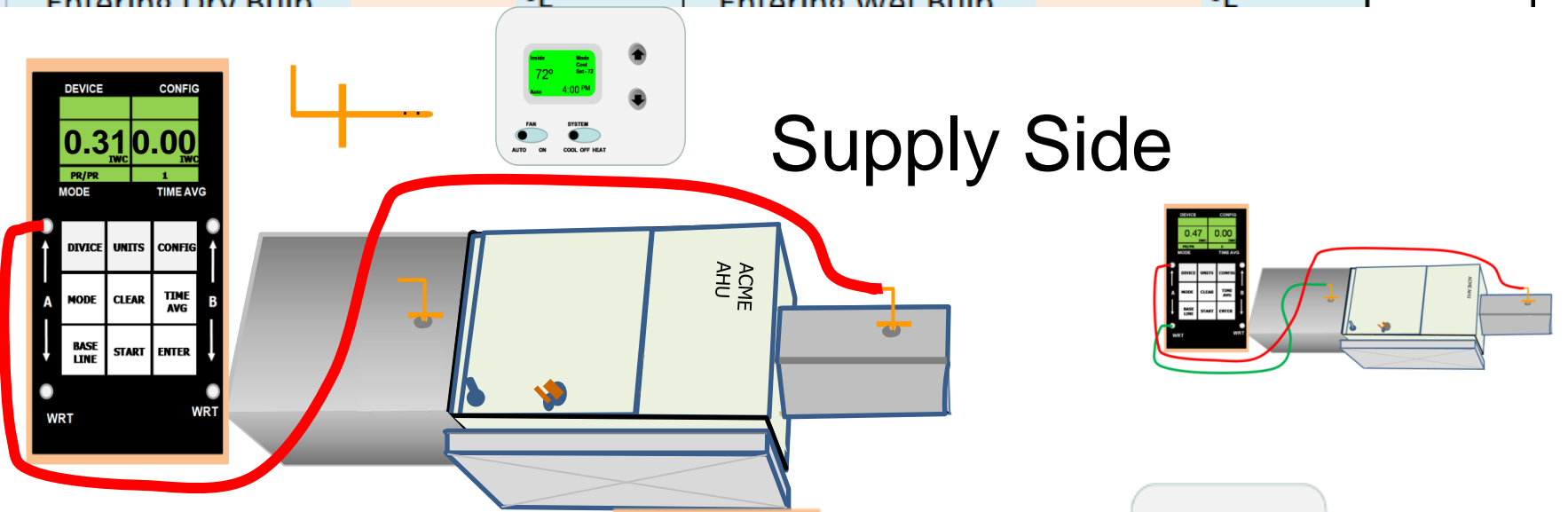
Electrical – Fan Amperage & Voltage

29	Indoor Section							
30	Airflow at Evap Coil	1150	CFM	ODA Intake		CFM		
31	Measurement Method	FG						
32	Fan Speed Setting	MED	FLA	7.0	RLA	4.5	Voltage	227
33	RA Plenum Static Pressure IWC			SA Plenum Static Pressure IWC				

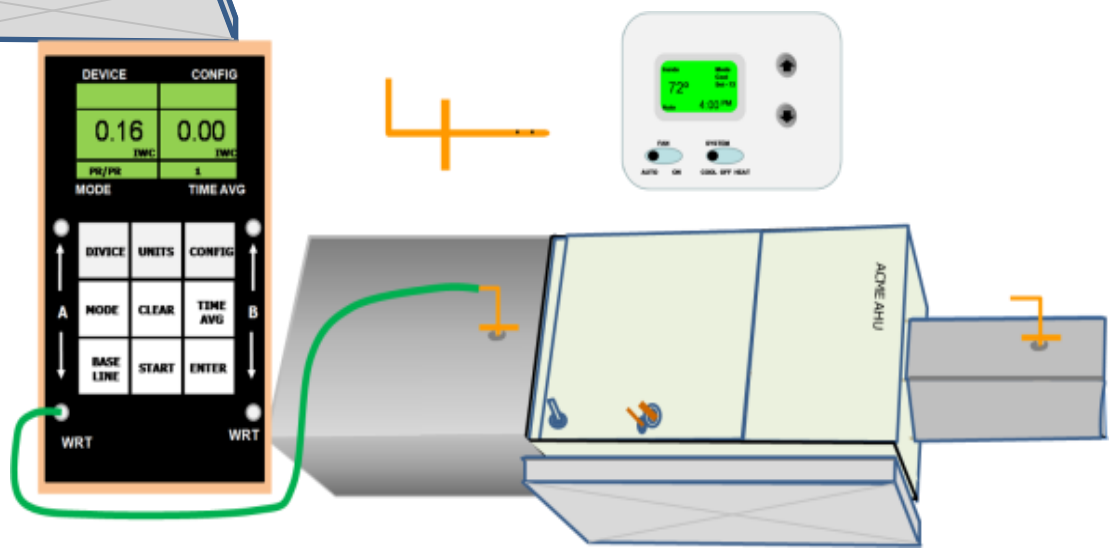


32	Fan Speed Setting	MED	FLA	7.0	RLA	4.5	Voltage	227
33	RA Plenum Static Pressure IWC	0.16	SA Plenum Static Pressure IWC	0.31				
34	Complete the next 4 entries while the Refrigeration Measurements are taken							
35	Entering Dry Bulb		°C	Entering Wet Bulb			°C	

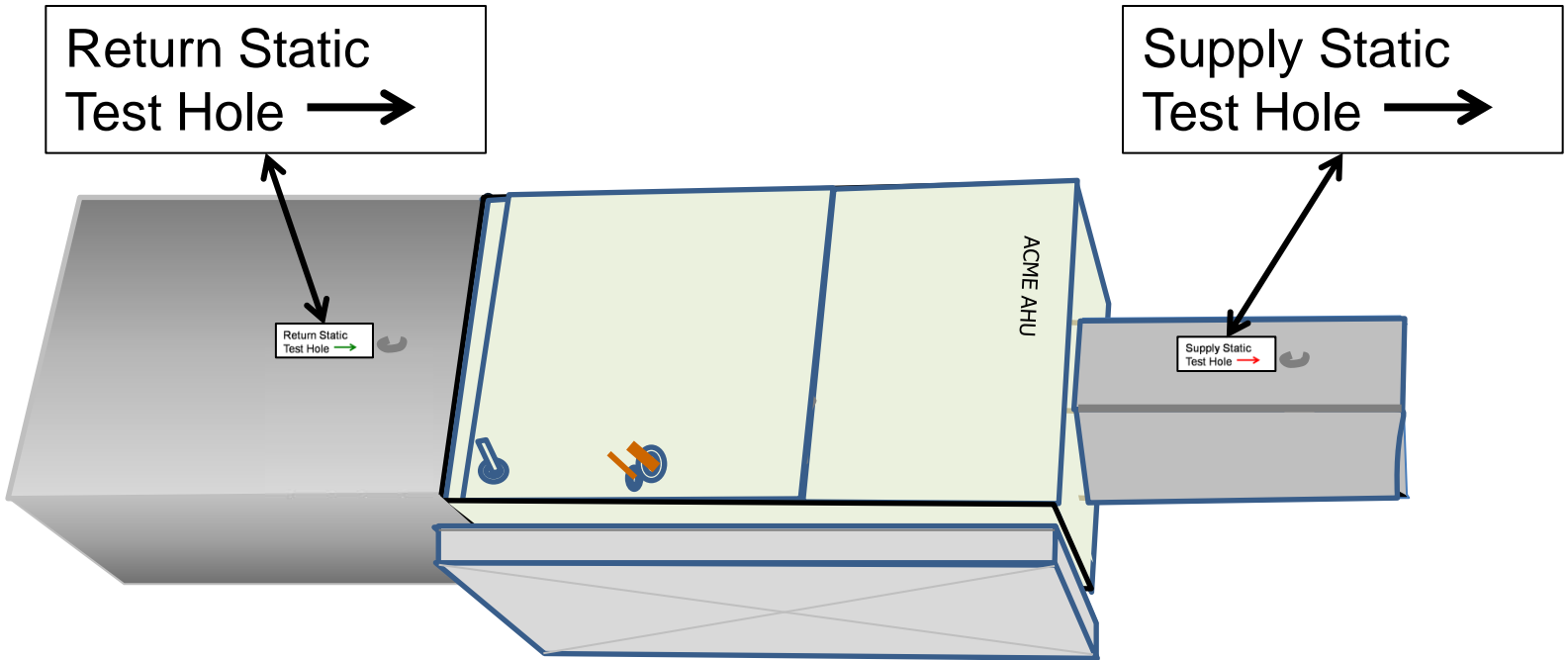
Supply Side



Return Side



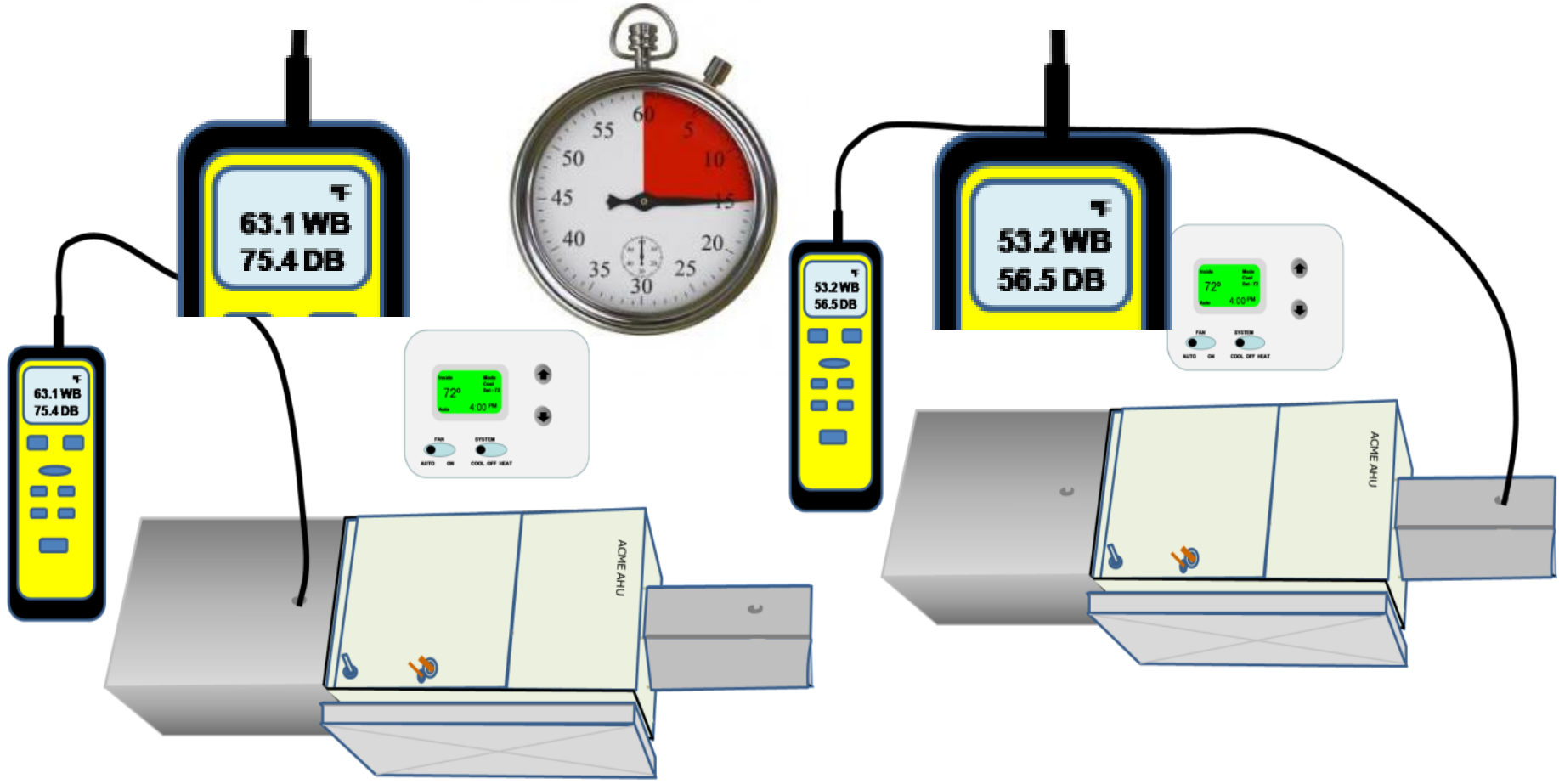
Mark the Holes



Return and Supply Air Conditions

Run system for 15 minutes before taking these measurements

34	Complete the next 4 entries while the Refrigeration Measurements are taken			
35	Entering Dry Bulb	75.4 °F	Entering Wet Bulb	63.1 °F
36	Leaving Dry Bulb	56.5 °F	Leaving Wet Bulb	53.2 °F

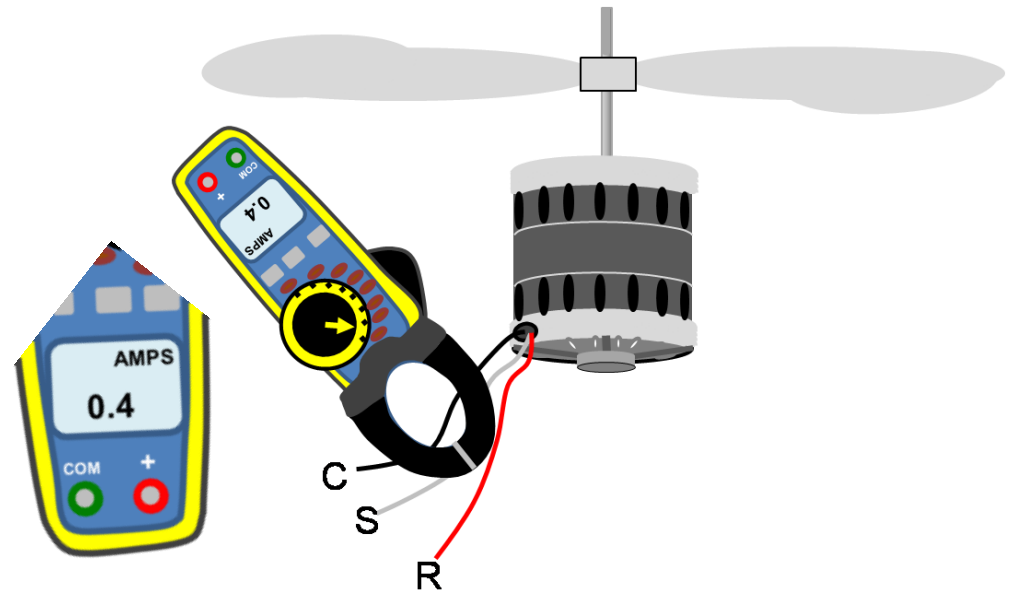


Data Collection - Outdoor Section - Electrical

Run system for 15 minutes before taking these measurements

Outdoor Section					
Electrical Measurements					
39					
40					
41	Compressor	FLA	12.7	RLA	10.5
42	OD Fan	FLA	0.5	RLA	0.4
43	Operating voltage				
44					

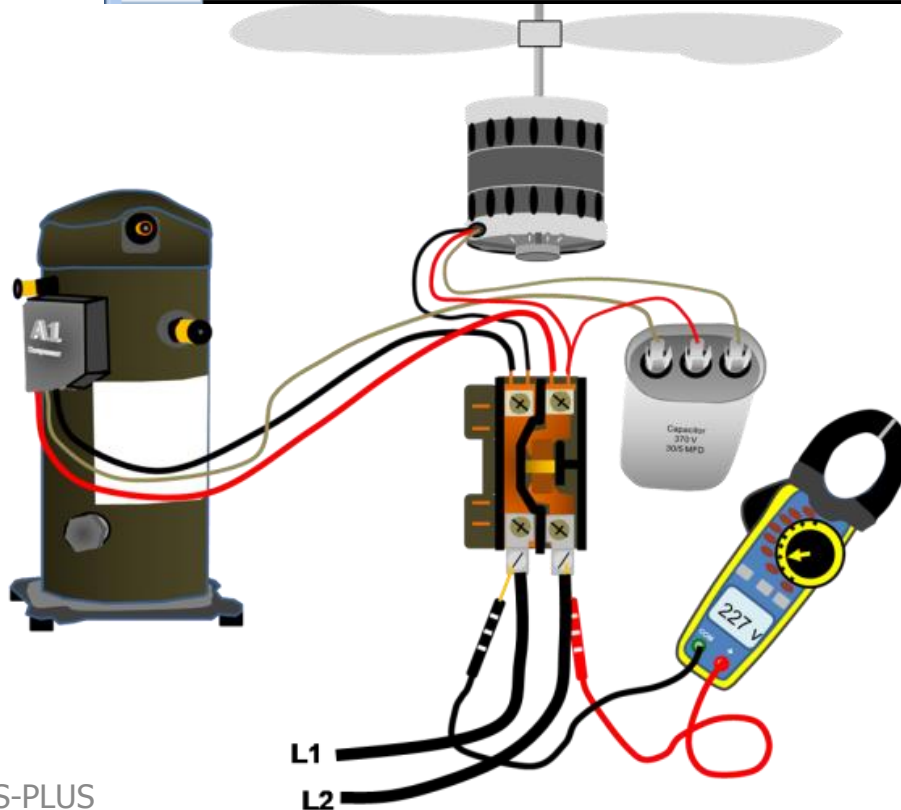
SCHEDULE FOR ELECTRICAL DATA					
COMPRESSOR	208/230	VOLTS AC			
1	PH	60	HZ		
12.7	FLA	52.0	LRA		
FAN MOTOR	208/230	VOLTS AC			
1	PH	60	HZ		
1/12	HP	0.5	FLA		
DESIGN/TEST PRESSURE GAGE					
150	PSI	3103	KPA		



Data Collection - Outdoor Section - Electrical

Run system for 15 minutes before taking these measurements

Outdoor Section					
Electrical Measurements					
41	Compressor	FLA	12.7	RLA	10.5
42	OD Fan	FLA		RLA	0.4
43	Operating voltage	227			
44					

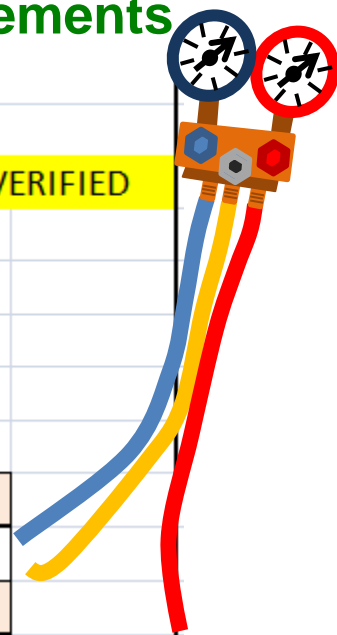


SUITABLE FOR SYSTEM					
COMPRESSOR	208/230	VOLTS AC			
1	PH	60	HZ		
12.7	FLA	52.0	LRA		
FAN MOTOR	208/230	VOLTS AC			
1	PH	60	HZ		
1/12	HP	0.5	FLA		
DESIGN/TEST PRESSURE GAGE					
	PSI	3103	KPA		

Data Collection - Outdoor Section - Refrigeration System

Run system for 15 minutes before taking these measurements

46	Outdoor Section			
47	Refrigeration Measurements			
48	Note: DO NOT COMPLETE THIS SECTION UNTILL AIRFLOW AT EVAPORATOR COIL IS VERIFIED			
49				
50	Refrigerant Type		Metering Device	
51				
52	Outdoor Ambient Temp		°F DB	
53				
54	Liquid Line Pressure		Liquid Line Temperature	
55	Cond Sat Temperature			
56	Suction Line Pressure		Suction Line Temperature	
57	Evap Sat Temperature			
58	If TXV			
59	OEM Required Sub Cooling		Measured Sub Cooling	0
60	Sub Cooling Deviation	0	Must be +/- 3° of OEM	
61	If Fixed Orifice or Cap Tube metering device			
62	Superheat Goal		Measured Superheat	0
63	Superheat must be +/- 5°F of Goal			
64				
65				



Refrigerant Type and Metering Device

49				
50	Refrigerant Type	410A	Metering Device	TXV
51				

SERIAL	4911E13607		
PROD	286BNA024000DCAA		
MODEL	286BNA024-C		
METERING DEVICE	TXV	46	PISTON
	INDOOR		OUTDOOR
FACTORY CHARGED	R410A		
	14.00 LBS	6.35	KG
INDOOR TXV SUB COOLING	9 °F		
POWER SUPPLY	208-230	VOLTS AC	
	1	PH	60 HZ
PERMISSIBLE VOLTAGE AT UNIT			
	253	MAX	197 MIN
SUITABLE FOR OUTDOOR USE			
COMPRESSOR	208/230	VOLTS AC	
	1	PH	60 HZ
	12.7	RLA	52.0 LRA
FAH MOTOR	208/230	VOLTS AC	
	1	PH	60 HZ
	1/12	HP	0.5 FLA
	TEST PRESSURE GAGE		



TXV



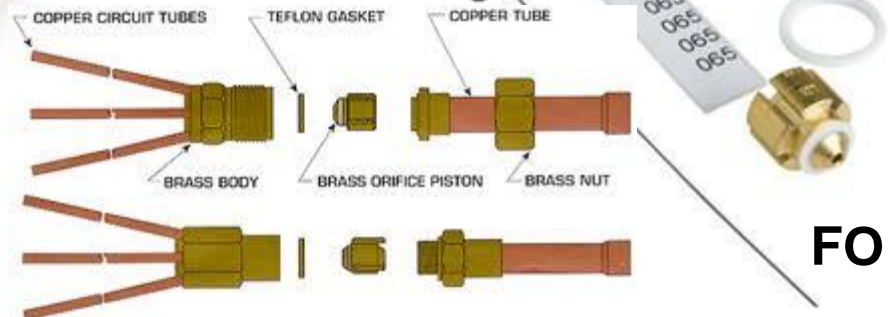
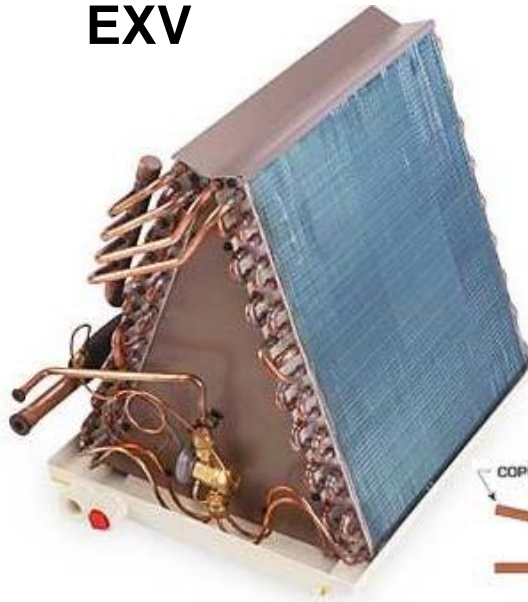
EXV



CT



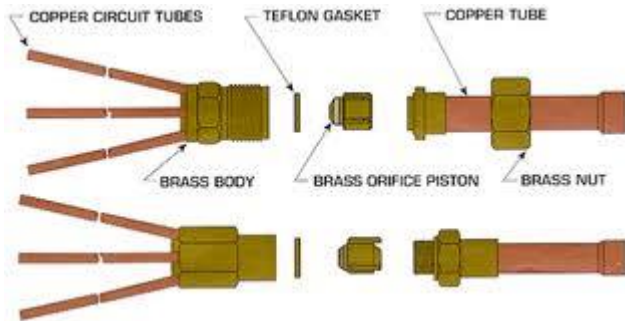
CALCS-PLUS



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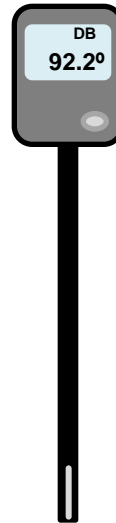
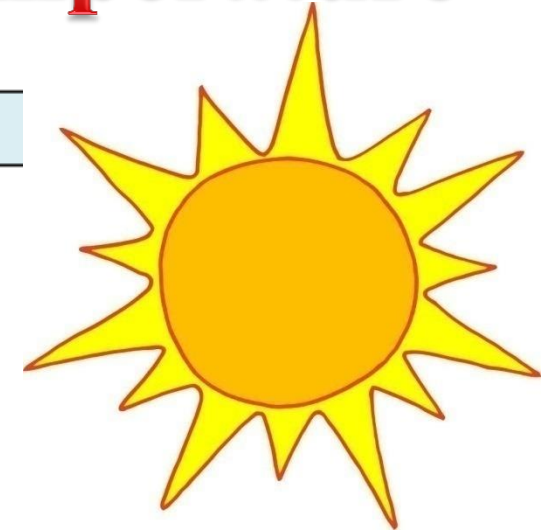
= Sub Cooling



= Superheat

Measure and Record the Condenser Entering Air Dry Bulb Temperature

51			
52	Outdoor Ambient Temp	92.2	°F DB
53			



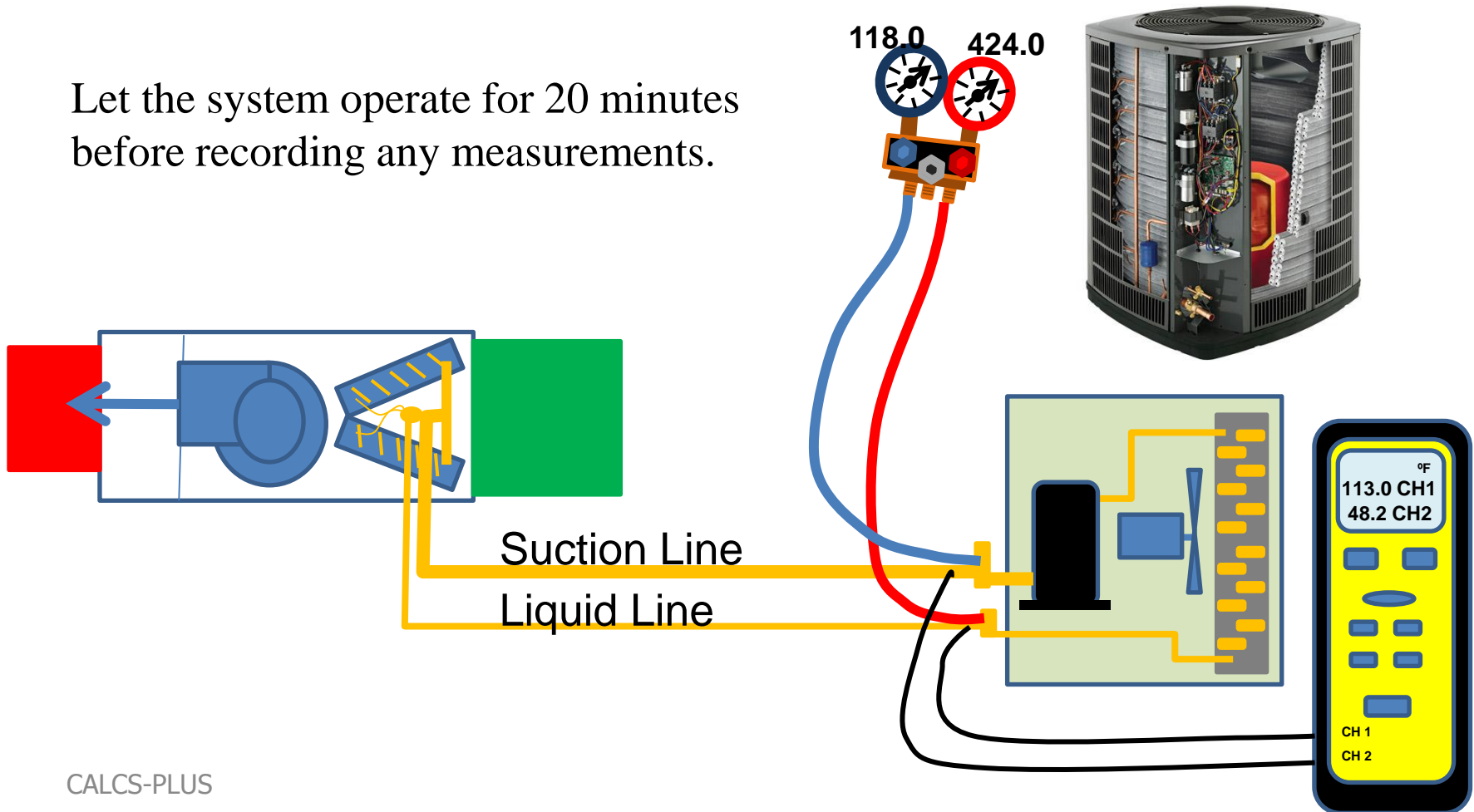
Make sure that the thermometer you are using is not being affected by any radiant heat such as the sun.

Connect Gauges and Temperature Sensors

Run system for 15 minutes before taking these measurements

54	Liquid Line Pressure	424	Liquid Line Temperature	113
55	Cond Sat Temperature			
56	Suction Line Pressure	118	Suction Line Temperature	48.2
57	Evap Sat Temperature			

Let the system operate for 20 minutes before recording any measurements.



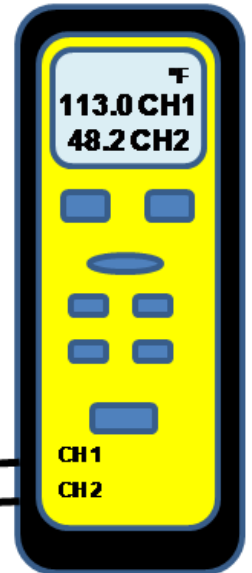
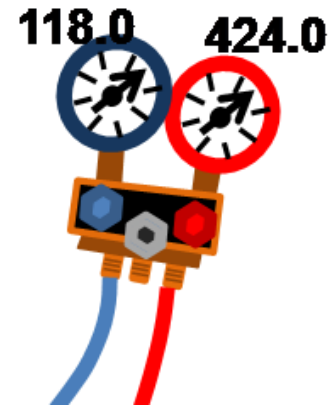
Saturation Temperatures

54	Liquid Line Pressure	424	Liquid Line Temperature	113
55	Cond Sat Temperature			
56	Suction Line Pressure	118	Suction Line Temperature	48.2
57	Evap Sat Temperature			

4	F	C	R-22	R-410 A
106	110	50	226.4	364
107	112	51.1	232.8	
108	114	51.7	239.4	
109	115	52.2		390
110	116	53.3	246.1	
111	118	54.4	252.9	
112	120	55.6	259.9	417
113	122	56.7	267	424
114	124	57.2	274.3	445
115	125	57.8		445
116	126	58.9	281.6	
117	128	60	289.1	
118	130	61.1	296.8	475
119	132	62.2	304.6	

4	F	C	R-22	R-410 A
58	28	5.6	52.4	92.9
59	30	6.7	54.9	96.8
60	32	7.8	57.5	101
61	34	8.9	60.1	105
62	36	10	62.8	109
63	38	10	65.6	114
64	40	11.1	68.5	118
65	42	12.2	71.5	123
66	44	12.8	74.5	127
67	46	13.3	77.6	132
68	48	14.4	80.7	137
69	50	15.6	84	142
70	50	16.7		
71	52	17.8	87.3	

123.2



Interpolation is Needed

Interpolation



2	Mesured Pressure		424	Interperlated Temp	123.75
3	HP Data point		445	HP Relative Temp	125
4	LP Data Point		417	LP Relative Temp	120
5					
6	F	C	R-22	R-410 A	
109	112	51.1	232.8		
110	114	51.7	239.4		
111	115	52.2		390	
112	116	53.3	246.1		
113	118	54.4	252.9		
114	120	55.6	259.9	417	
115	122	56.7	267		
116	124	57.2	274.3		
117	125	57.8		445	
118	126	58.9	281.6		
119	128	60	289.1		
120	130	61.1	296.8	475	
121	132	62.2	304.6		
122	134	62.8	312.5		
123	135	63.3		506	
124	136	64.4	320.6		
125	138	65.6	328.9		
126	140	67.8	337.3	538	

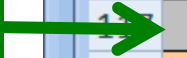
LP Relative Temp



LP Data Point



HP Relative Temp



HP Data Point



Sub Cooling



50	Refrigerant Type	410A	Metering Device	TXV
51				
52	Outdoor Ambient Temp	94	°F DB	
53				
54	Liquid Line Pressure	424	Liquid Line Temperature	113
55	Cond Sat Temperature	123		
56	Suction Line Pressure	118	Suction Line Temperature	48.2
57	Evap Sat Temperature	40		
58				
59	OEM Required Sub Cooling	9	Measured Sub Cooling	10
60	Sub Cooling Deviation	1	Must be +/- 3° of OEM	
61	If Fixed Orifice or Cap Tube metering device			
62	Superheat Goal		Measured Superheat	8.2
63	Superheat must be +/- 5°F of Goal			
64				
65				
66				
67				
68				

SERIAL	4911E13607		
PROD	286BNA024000DCAA		
MODEL	286BNA024-C		
METERING DEVICE	TXV	46	PISTON
	INDOOR		OUTDOOR
FACTORY CHARGED	R410A		
	14.00	LBS	6.35
			KG
INDOOR TXV SUB COOLING	9		°F
POWER SUPPLY	208/230		VOLTS AC
	1		PH
	60		HZ
PERMISSIBLE VOLTAGE AT UNIT	253	MAX	197
			MIN
SUITABLE FOR OUTDOOR USE			
COMPRESSOR	208/230		VOLTS AC
	1		PH
	60		HZ
	12.7	RLA	52.0
			LRA
FAN MOTOR	208/230		VOLTS AC
	1		PH
	60		HZ
	1/12	HP	0.5
			FLA



Super Heat



Product Specifications

Model No. ①	4TTB3018A1	4TTB3024A1	4TTB3030A1	4TTB3036A1
Electrical Data V/Ph/Hz ②	200/230/1/60	200/230/1/60	200/230/1/60	208/230/1/60
Min Cir Ampacity	9	12	15	20
Max Fuse Size (Amps)	15	20	25	35
Compressor	CLIMATUFF®	CLIMATUFF®	CLIMATUFF®	CLIMATUFF® - SCROLL
RL Amps - LR Amps	6.4 - 38.6	8.8 - 57.8	11.1 - 63	15.4 - 83
Outdoor Fan FL Amps	0.7	0.7	0.7	0.7
Fan HP	1/8	1/8	1/8	1/8
Fan Dia (inches)	23.0	23.0	23.0	23.0
Coil	Spine Fin™	Spine Fin™	Spine Fin™	Spine Fin™
Refrigerant R-410A	5/04-LB/OZ	5/10-LB/OZ	5/11-LB/OZ	6/07-LB/OZ
Line Size - (in.) O.D. Gas ③	1/2	5/8	3/4	3/4
Line Size - (in.) O.D. Liquid ④	1/4	5/16	5/16	3/8
Charge Spec. Subcooling	10°	10°	10°	10°
Dimensions	42 X 30.1 X 33			
Weight - Ship				236
Weight - Net				208
Start Compo				NO
Sound Enclosure	YES	YES	YES	NO
Compressor Sump Heat	NO	NO	NO	NO
Optional Accessories: ④				
Anti-short Cycle Timer	TAYASCT501A	TAYASCT501A	TAYASCT501A	TAYASCT501A
Evaporator Defrost Control	AY28X079	AY28X079	AY28X079	AY28X079
Rubber Isolator Kit	BAYISLT101	BAYISLT101	BAYISLT101	BAYISLT101
Extreme Condition Mounting Kit	BAYECMT001	BAYECMT001	BAYECMT001	BAYECMT001

Super Heat Look-Up Tab

Cx Checklist Residential 10-13-12.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Acrobat PDF-XChange 4

Clipboard Font Alignment Number

Calibri 11

Wrap Text Merge & Center

General

\$ % , .0 .00

Condition Formatting

		OR NON-TXV SYSTEMS (R410A & R22)															
		- Dry Bulb															
		91	92	93	58	59	60	61	62	63	64	65	66	67	68		
Indoor Entering Wet Bulb	57	X	X	X	7.8	7.4	7	6.2	5.6	5.0	4.6	4	3.6	3.2	2.8		
	58	X	X	X	9.3	8.9	8.5	7.4	6.3	5.2	4.1	3	2	1	0		
	59	X	X	X	10.8	10.4	10	9.2	8.4	7.6	6.8	6	5.4	4.9	4.5		
	60	X	X	X	11.8	11.4	11	10.4	9.8	9.2	8.6	8	7.1	6.2	5.3		
	61	X	X	X	12.8	12.4	12	11.6	11.2	10.8	10.4	10	9.4	8.8	8.2		
	62	X	X	X	14.3	13.9	13.5	13.1	12.7	12.3	11.9	11.5	10.9	10.3	9.7		
	63	6.2	5.4	4.6	15.8	15.4	15	14.6	14.2	13.8	13.4	13	12.4	11.8	11.2		
	64	8.4	7.8	7.2	17.3	16.9	16.5	16.1	15.7	15.3	14.9	14.5	13.9	13.3	12.7		
	65	10.4	9.8	9.2	18.8	18.4	18	17.6	17.2	16.8	16.4	16	15.4	14.8	14.2		
	66	12.4	11.8	11.2	20.3	19.9	19.5	19.1	18.7	18.3	17.9	17.5	16.9	16.3	15.7		
				21.8	21.4	21	20.6	20.2	19.8	19.4	19	18.4	17.8	17.2			
				23.3	22.9	22.5	22	21.5	21	20.5	20	19.5	19	18.5			
				24.8	24.4	24	23.4	22.8	22.2	21.6	21	20.6	20.2	19.8			
				26.3	25.9	25.5	24.9	24.3	23.7	23.1	22.5	22	21.5	21			
				27.8	27.4	27	26.4	25.8	25.2	24.6	24	23.4	22.8	22.2			
				29.3	28.9	28.5	27.9	27.3	26.7	26.1	25.5	24.9	24.3	23.7			
				30.8	30.4	30	29.4	28.8	28.2	27.6	27	26.4	25.8	25.2			
				32.3	31.9	31.5	30.9	30.3	29.7	29.1	28.5	27.9	27.3	26.7			
				33.8	33.4	33	32.4	31.8	31.2	30.6	30	29.4	28.8	28.2			
				34.8	34.4	34	33.5	33	32.5	32	31.5	30.9	30.3	29.7			
				35.8	35.4	35	34.6	34.2	33.8	33.4	33	32.4	31.8	31.2			
				37.3	36.9	36.5	36.1	35.7	35.3	34.9	34.5	33.9	33.3	32.7			
				38.8	38.4	38	37.6	37.2	36.8	36.4	36	35.4	34.8	34.2			
				39.8	39.4	39	38.6	38.2	37.8	37.4	37	36.5	36	35.5			
				40.8	40.4	40	39.6	39.2	38.8	38.4	38	37.6	37.2	36.8			
				42.3	41.9	41.5	41.1	40.7	40.3	39.9	39.5	39.1	38.7	38.3			
				43.8	43.4	43	42.6	42.2	41.8	41.4	41	40.6	40.2	39.8			

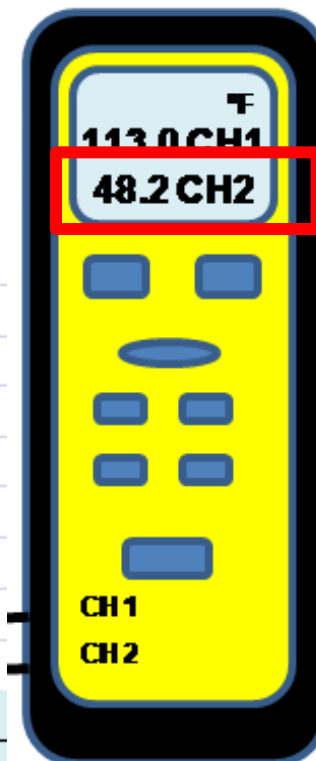
Ready

General Air Conditioner Heat Pump Gas Furnace CAZ Superheat Look-up TP Chart

118.0



Super Heat



50	Refrigerant Type	410A	Metering Device	TXV
51				
52	Outdoor Ambient Temp	94	°F DB	
53				
54	Liquid Line Pressure	424	Liquid Line Temperature	113
55	Cond Sat Temperature	123		
56	Suction Line Pressure	118	Suction Line Temperature	48.2
57	Evap Sat Temperature	40		
58	If TXV			
59	OEM Required Sub Cooling	9	Measured Sub Cooling	10
60	Sub Cooling Deviation	1	Must be +/- 3° of OEM	
61	If Fixed Orifice or Cap Tube metering device			
62	Superheat Goal	10	Measured Superheat	8.2
63	Superheat must be +/- 5°F of Goal			
64				
65				
66				
67				
68				

Remember, If

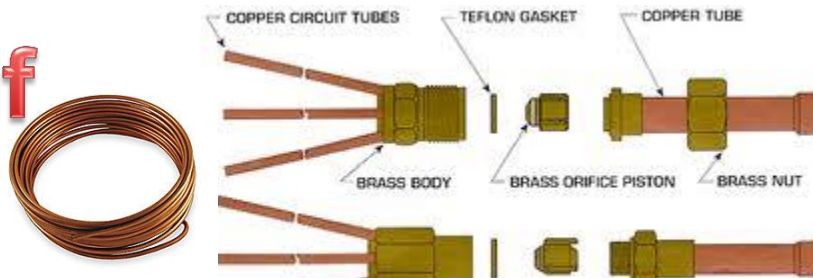


Sub Cooling

50	Refrigerant Type	410A	Metering Device	TXV
51				
52	Outdoor Ambient Temp	94	°F DB	
53				
54	Liquid Line Pressure	424	Liquid Line Temperature	113
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58	If TXV			
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62	Superheat Goal	10	Measured Superheat	8.2
63	Superheat must be +/- 5°F of Goal			
64				
65				
66				
67				
68				

General | **Air Conditioner** | Heat Pump | Gas Furnace | CAZ | Superheat Look-up

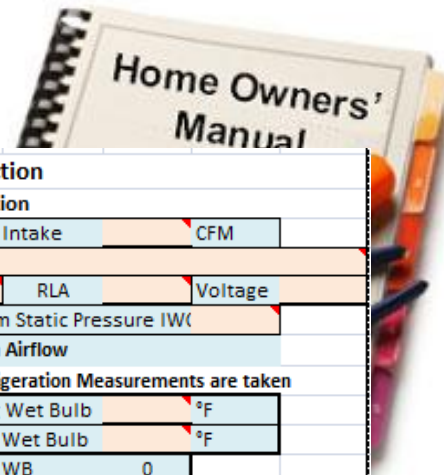
Remember, If



Superheat

50	Refrigerant Type	410A	Metering Device	TXV
51				
52	Outdoor Ambient Temp	94	°F DB	
53				
54	Liquid Line Pressure	424	Liquid Line Temperature	113
55	Cond Sat Temperature	123		
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60	Sub Cooling Deviation	1	Must be +/- 3° of OEM	
61	If Fixed Orifice or Cap Tube metering device			
62	Superheat Goal	10	Measured Superheat	8.2
63	Superheat must be +/- 5°F of Goal			
64				
65				
66				
67				
68				

And, that's all there is to it!



Air Conditioner Commissioning Checklist							
Fill out this form for each system							Date
Job Name 0				Contractor 0			
Address 0				Address 0			
City 0		State 0		City 0		State 0	
ZIP 0			ZIP 0				
Technician 0				Verifier 0			
Equipment to be Commissioned							
Condenser MFG				Model #			
				Serial #			
Evap or AHU MFG				Model #			
				Serial #			
Furnace				Model #			
Fill out Gas Furnace Tab and CAZ Tab				Serial #			
AHRI Certification #				OEM Performance Data Attached Y/N			
OEM BTU/h output at				°F Outdoor Temperature			
When Indoor conditions are		75°F		Dry Bulb 63°F		Wet Bulb	
Net Output =		Sensible Output=		at		CFM	
HVAC Load Calculations							
(for new construction, must be room by room calculation)		Heating 98% DB		Cooling 1% DB		Coincident Wet Bulb	
Outdoor Conditions				Design Grains Diff		Daily Range	
Net Heat Gain =		Sens =		Heat Loss =			
Design Airflow =		0 CFM					

Data Collection			
Indoor Section			
Airflow at Evap Coil	0 CFM	ODA Intake	CFM
Measurement Method			
Fan Speed Setting	FLA	RLA	Voltage
RA Plenum Static Pressure IW		SA Plenum Static Pressure IW	
Measured Airflow is #DIV/0! of Design Airflow			
Complete the next 4 entries while the Refrigeration Measurements are taken			
Entering Dry Bulb	°F	Entering Wet Bulb	°F
Leaving Dry Bulb	°F	Leaving Wet Bulb	°F
Δ DB	0	Δ WB	0
Outdoor Section			
Electrical Measurements			
Compressor	FLA	RLA	
OD Fan	FLA	RLA	
Operating voltage			
Outdoor Section (Out Door Dri Bulb shall be above 55° F)			
Refrigeration Measurements			
Note: DO NOT COMPLETE THIS SECTION UNTILL AIRFLOW AT EVAPORATOR COIL IS VERIFIED			
The Refrigeration System shall run for 15 before measurements are taken			
Refrigerant Type	410A	Metering Device	TXV
Outdoor Ambient Temp 94 °F DB			
Liquid Line Pressure	424	Liquid Line Temperature	113
Cond Sat Temperature	123	Suction Line Temperature	48.2
Suction Line Pressure	118	Suction Line Temperature	48.2
Evap Sat Temperature	40		
If TXV			
OEM Required Sub Cooling	9	Measured Sub Cooling	10
Sub Cooling Deviation		1 Must be +/- 3° of OEM	
If Fixed Orifice or Cap Tube metering device			
Superheat Goal	10	Measured Superheat	8.2
Superheat must be +/- 5°F of Goal			

Take it for a Test Drive

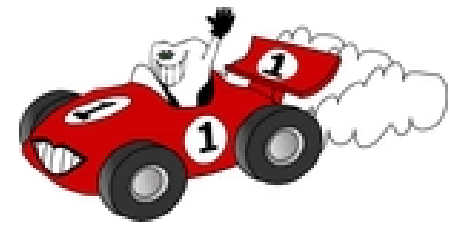
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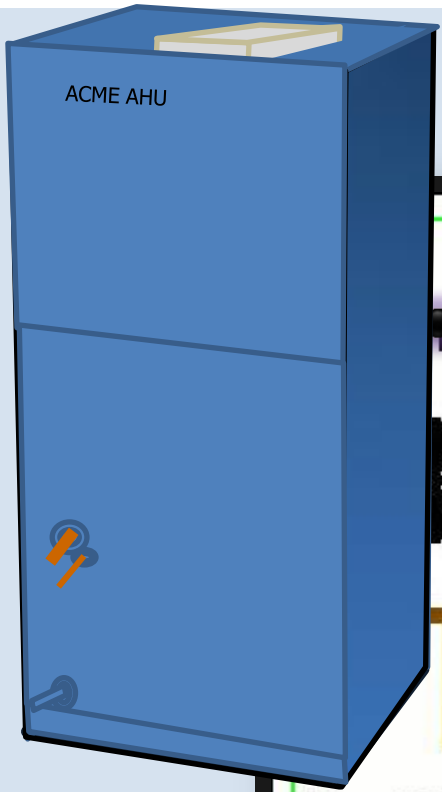
Please Comment



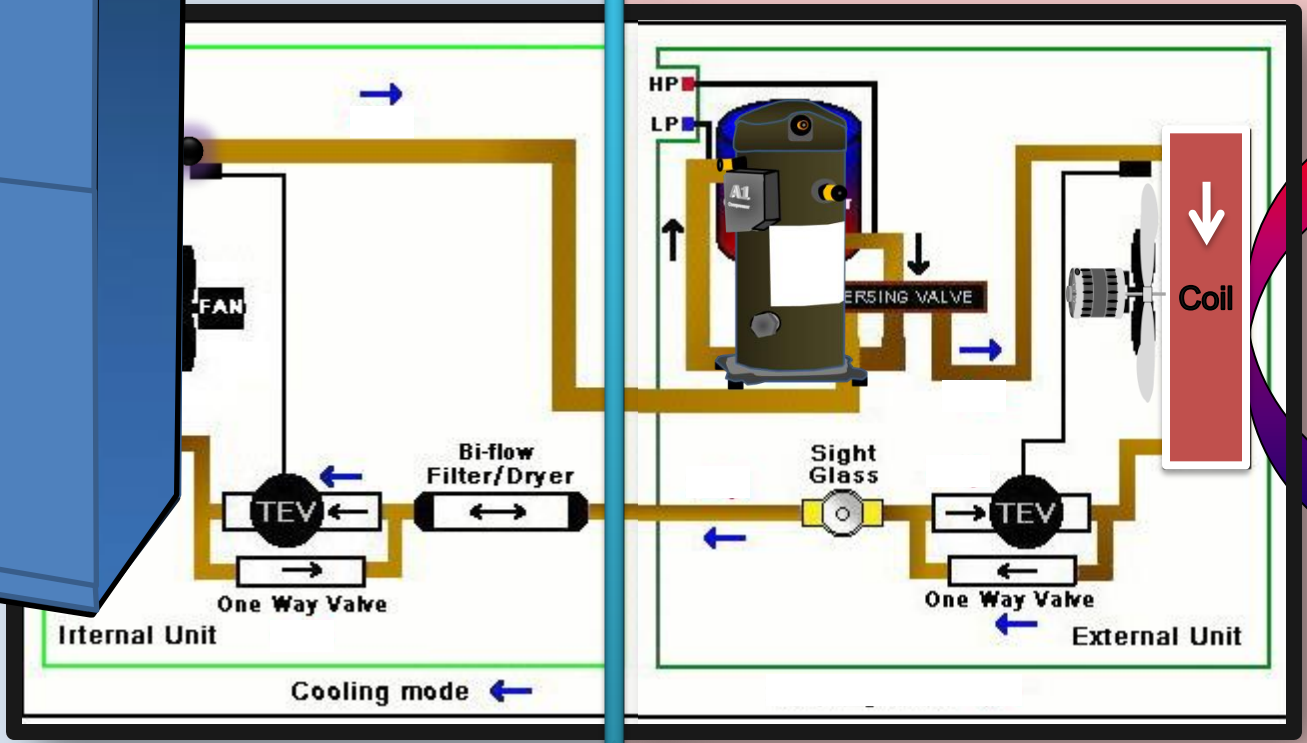
Air Conditioner Commissioning Checklist					
Fill out this form for each system					
					Date
Job Name 0			Contractor 0		
Address 0			Address 0		
City 0	State 0		City 0	State 0	
ZIP 0			ZIP 0		
Technician 0					
Equipment to be					
Condenser MFG					
Evap or AHU MFG					
Furnace					
Fill out Gas Furnace Tab and					
AHRI Certification #					
OEM BTU/h output at					
When Indoor conditions are		75°F	Dry		
Net Output =		Sensible Output =			
HVAC Load Calculations					
(for new construction, must be room by room calculation)					
Outdoor Conditions		Heating 98% DB	Cooling 1% DB	Coincidence Wet Bulb	Calcs Attached Y/N
Net Heat Gain =		Sens =	Heat Loss =		
Design Airflow =		0 CFM			

Data Collection			
Indoor Section			
30	Airflow at Evap Coil	0 CFM	ODA Intake
31	Measurement Method		CFM
32	Fan Speed Setting	FLA	RLA Voltage
33	SA Plenum Static Pressure IW		SA Plenum Static Pressure IW
34	Measured Airflow is #DIV/0! of Design Airflow		
35	Complete the next 4 entries while the Refrigeration Measurements are taken		
36	Entering Dry Bulb	°F	Entering Wet Bulb
37	Leaving Dry Bulb	°F	°F
38	Δ DB	0	
39	Outdoor Electric		
40	Compressor		
41	OD Fan		
42	Operating		
43	TXV		
44	°F DB		
45	Pressure	424	Liquid Line Temperature
	Temperature	123	
	Pressure	118	Suction Line Temperature
	Temperature	40	
If TXV			
	Required Sub Cooling	9	Measured Sub Cooling
60	Sub Cooling Deviation	1	Must be +/- 3° of OEM
If Fixed Orifice or Cap Tube metering device			
62	Superheat Goal	10	Measured Superheat
63	Superheat must be +/- 5°F of Goal		
64			
65			

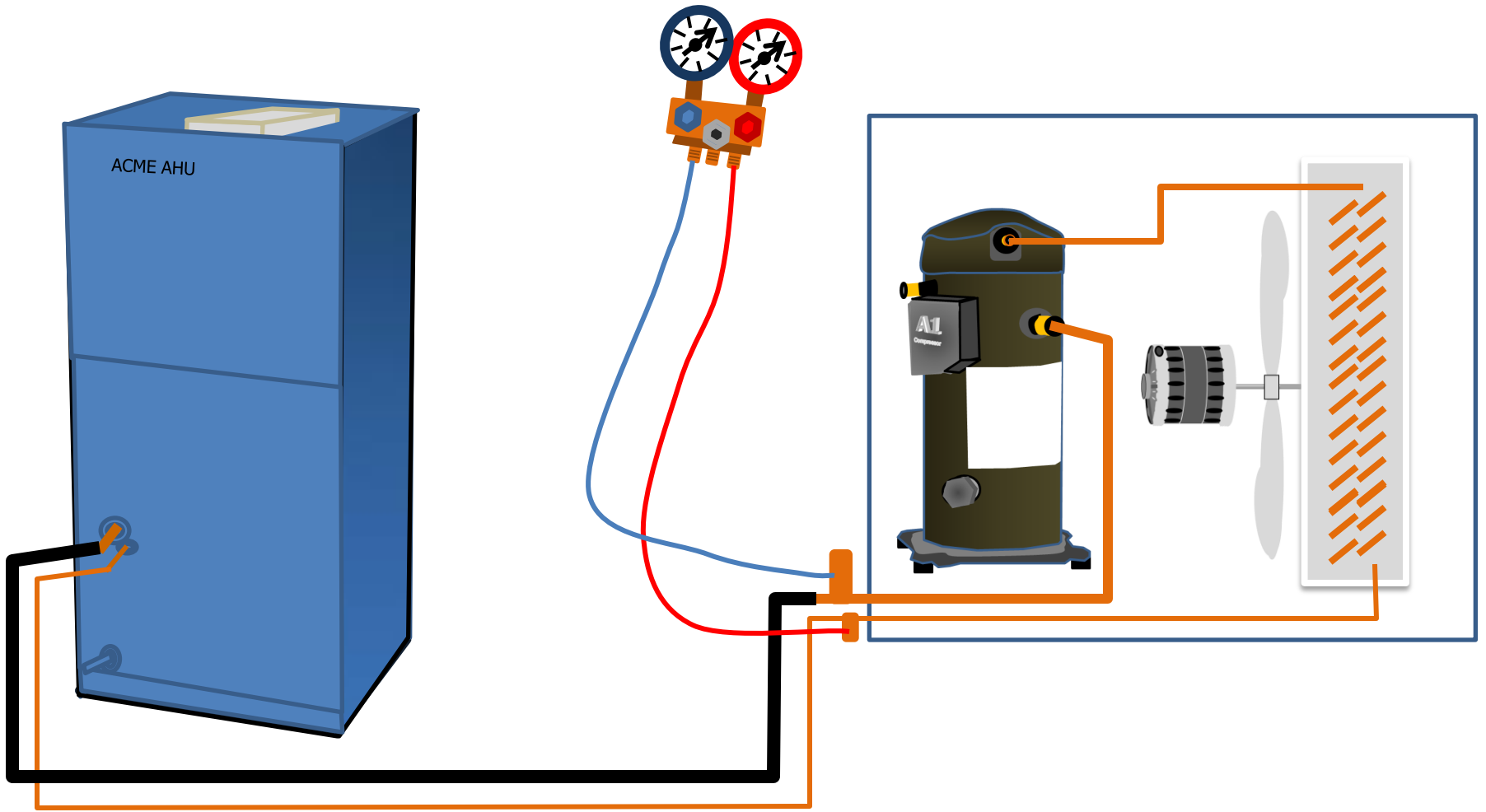


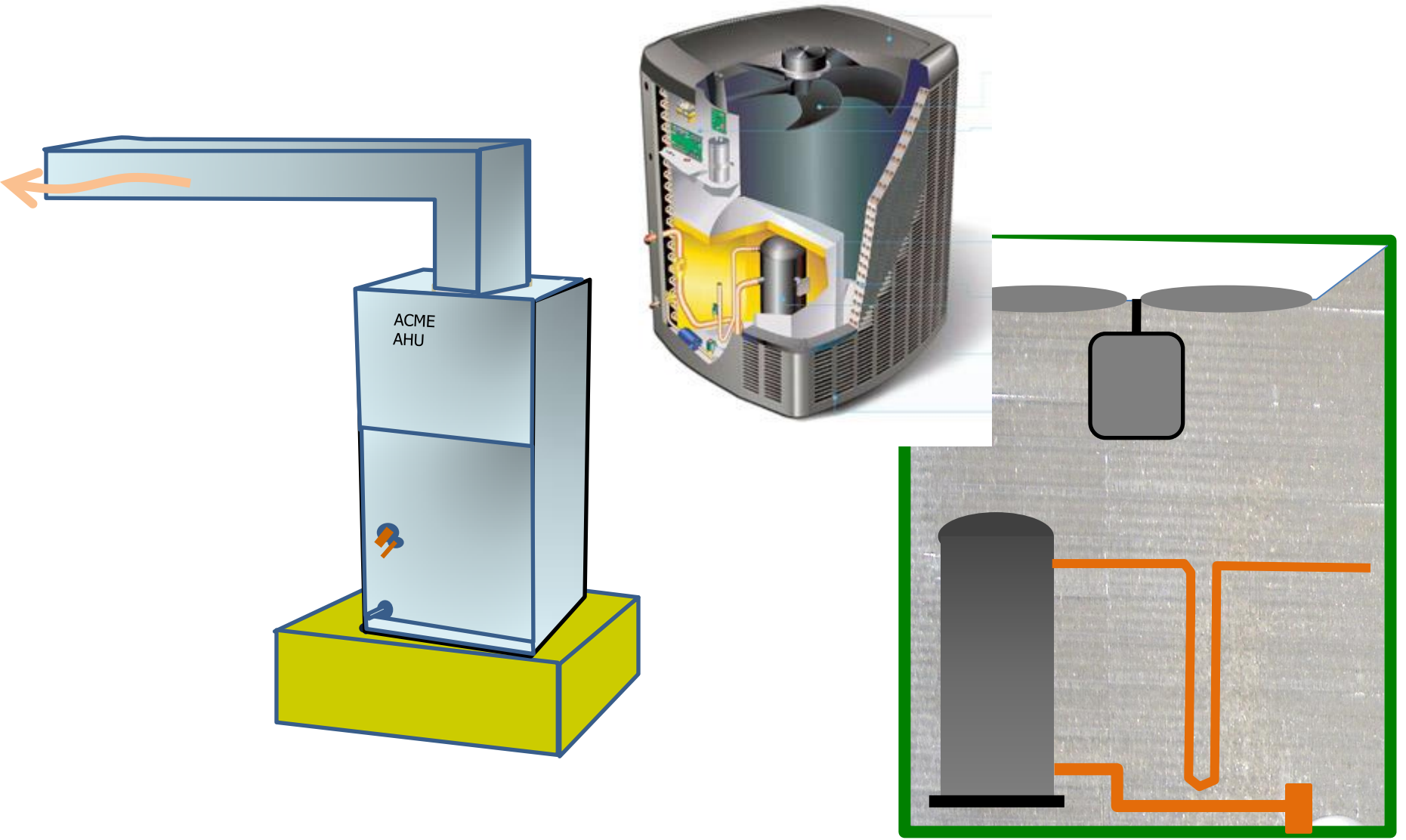


Cooling Mode



Inside Outside







CALCS-PLUS

