

Tool Type

Tool Name & Description

Air Capture Hood



Air Capture Flow Hood - Electronic Balometer

Manufacturer: TSI, Inc. Model: Alnor 8371 Measures: Air Flow

Description: Measures exhaust and supply air volume flowing through registers, diffusers and grilles. Includes 24" x 24" air capture hood. 24" x 48" air capture hood available upon request. The meter has

an LCD readout for instantaneous display of readings.

Sensor: Range (Accuracy):

- Supply/Exhaust Air Flow: 30 to 2000 cfm (± 5% reading + 5 cfm)

Title 24 Notes: Instrument has been certified to California Energy Commission (CEC) to verify ventilation system airflow and Forced Air Systems under Title 24, Part 6 section 100.0(h) and Residential Appendices Section RA3.7 and RA3.3.

esidential Appendices Section RA3.7 and RA3.3



LoFlo Air Capture Flow Hood - Electronic Balometer Manufacturer: TSI, Inc.
Model: Alnor 6200F

Description: Measures very low exhaust and supply volumetric air volume flowing through registers, diffusers and grilles. Includes $16" \times 16" \times 18"$ tall air capture hood. This light weight instrument is great for residential or light commercial use. The compact size allows them to be used where full size hoods would not fit such as over bathroom stalls or filing cabinets. The meter has an LCD readout for

instantaneous display of readings.

Sensor: Range (Accuracy):

Measures: Air Flow

- Supply/Exhaust Air Flow: 10 to 500 cfm (± 3% reading + 5 cfm)

Title 24 Notes: Instrument has been certified to California Energy Commission (CEC) for use to verify ventilation system airflow and Forced Air Systems under Title 24, Part 6 section 100.0(h) and Residential Appendices Section RA3.7 and RA3.3.

Air Flow Grid



TrueFlow Air Handler Flow Meter

Manufacturer: The Energy Conservatory

Model: Model 3 with DG-700

Measures: Air Flow

Description: The Energy Conservatory's TrueFlow® Air Handler Flow Meter is designed to provide a simple and accurate measurement of air flow through residential air handlers. The air flow rate through residential air handlers is an important variable in estimating and optimizing the performance of heat pumps and air conditioners.

The TrueFlow Meter temporarily replaces the filter in a typical air handler system during the air flow measurement procedure. If the filter location is directly adjacent to the air handler, the TrueFlow Meter will measure the total air handler flow. If the filter is located remotely at a single central return, the TrueFlow Meter will measure the air flow through the central return.

Sensor: Range (Accuracy):

- Air Flow through Air Handlers rated from 1 to 5 tons, 365 to 2,100 CFM (\pm 7% for most applications when used with a 1% accurate pressure gauge)



Tool Type

Tool Name & Description

Anemometer Wind Vane



Anemometer Wind Vane Manufacturer: Testo

Model: 417

Measures: Air Velocity and Temperature, calculates volumetric flow

Wind vane anemometer allows you to carry out quick and precise measurements at air inlets and outlets. The easy-to-read display shows air flow speed and direction as well as volumetric flow rate and temperature. The meter can also calculate the mean time value, average value and minimum and maximum value at the touch of a key.

Sensor: Range (Accuracy):

- Temperature: +32°F to +122°F (\pm 0.9°F \pm 1 Digit) - Air Velocity: 0.3-20 m/s (\pm 0.1 m/s + 1.5% of reading)

Blower Door



Minneapolis Blower Door

Manufacturer: The Energy Conservatory

Model: Model 3 with DG-700

Measures: Air Flow

Description: Air tightness testing system includes a variable speed fan that is sealed into an exterior doorway and is used to blow air in or out of a building for infiltration or exfiltration (air leakage) studies. Kit also includes five piece adjustable door frame, fabric door panel with viewing window and digital pressure and flow gauge.

Blower door testing is used to measure the air tightness level of building envelopes, diagnose and demonstrate air leakage problems, estimate natural infiltration rates, estimate efficiency losses from building air leakage, and certify construction integrity.

Sensor: Range (Accuracy):

- Air Flow: 30 to 6,300 CFM (\pm 3% with DG-700, Rings D&E \pm 4% or 1 CFM)

Title 24 Notes: Instrument meets requirements for building air leakage testing apparatus air flow measurement accuracy and calibration under Title 24, Part 6 and the Residential Appendices Section RA3.8.11 Equipment Accuracy and Requirements.

Borescope



Borescope

Manufacturer: EXTECH

Model: BR200

Description: The video borescope or "inspection camera" is similar to a flexible borescope but uses a miniature video camera at the end of the flexible tube. The end of the insertion tube includes a light which makes it possible to capture video or still images deep within equipment, building assemblies and other dark spaces. As a tool for remote visual inspection the ability to capture video or still images for later inspection is beneficial. A display in the handle shows the camera view.



Tool Type

Tool Name & Description

Calibration Plate



Duct Blaster Field Calibration Plate Manufacturer: The Energy Conservatory Measures: Duct Blaster Calibration

Description: The Field Calibration Plate allows you to quickly check the calibration of the entire Duct Blaster System with DG-700 gauge. The calibration plate, which contains a 5 inch diameter hole, is mounted on the square transition piece that is connected to the end of the flex duct. The Duct Blaster fan is turned on to pull air through the calibration plate and simulate a duct leakage test. Results from the simulated test are compared to the known leakage rate to determine if the entire system is within a +/- 3% accuracy range. It can be used to document calibration compliance for testing programs. The field calibration plate is designed to simulate a duct leakage test with a leakage rate of 106 cfm at 25 Pascals.

CO Monitor



Personal CO Monitor Manufacturer: Testo Model: 317

Measures: CO

Description: The CO monitor detects the presence of carbon monoxide (CO) in ambient air and warns the user both visually and audibly about dangerous CO concentrations during furnace and boiler service and maintenance, weatherization audits or home inspections.

Sensor: Range (Accuracy): · CO: 0 to 1,999 ppm (± 5%)

CO2 & Temperature Monitor



Carbon Dioxide & Temperature Monitor

Manufacturer: Telaire

Model: 7001

Measures: CO2, Temperature

Description: Hand-held CO2 and temperature monitor with digital display and push-button interface used for measuring CO2 levels and temperature. The monitor is equipped with a 0-4 V output that can be sent to a data logger for long-term monitoring and recording.

Sensor: Range (Accuracy):

 \cdot CO2: 0 - 10,000 ppm for display and 0 to 4000 ppm for voltage output (± 50 ppm or 5% of reading, whichever is greater)

Temperature: 32 to 122° F for display and 32 to 104° F for voltage output (± 2° F)

Combustible Gas Leak Detector



Combustible Gas Leak Detector Manufacturer: Bacharach

Model: Leakarator 10

Measures: Combustible gases including natural gas and propane

Description: The Leakator 10 is a low maintenance combustible gas leak detection unit, small enough to be operated with just one hand, yet loaded with advanced features and technology professionals demand. The Leakator 10 includes a flexible 20-inch long probe for hard-to-reach areas. The Leakator

10 can detect gas leaks for 15 different combustible gases.



Tool Type

Tool Name & Description

Combustion Analyzer



Combustion Analyzer
Manufacturer: Bacharach

Model: PCA3

Measures: CO, O₂, CO₂, NO_x, NO, NO₂, SO₂, Pressure, Ambient Air Temperature, Stack Temperature **Description:** The Combustion Analyzer is a hand-held measuring instrument for the professional flue gas analysis of domestic and light commercial gas and oil boilers and appliances including condensing boilers and gas heaters. Kit includes IR printer to print out test results.

Sensor: Range (Accuracy):

Air Temperature: -4 to 999°F (32° to 212°: ± 2°F)

Stack Temperature: -4 to 2192° F ($\pm 4^{\circ}$ F between 32° and 255° F; $\pm 6^{\circ}$ F between 256° and 480° F; $\pm 4^{\circ}$ F

between 32° and 255°F) Oxygen: 0.1 to 20.9%

Carbon Monoxide (H₂ Compensated): 0 to 4,000 ppm Carbon Monoxide (High Range): 4,001 to 20,000 ppm

Nitric Oxide: 0 to 3,000 ppm Nitrogen Dioxide: 0 to 500 ppm Sulfur Dioxide: 0 to 5,000 ppm

Pressure: ± 72 inwc



Combustion Analyzer Manufacturer: Testo

Model: 327-2

Measures: CO, O2, CO2, Pressure, Ambient Air Temperature, Stack Temperature

Description: The Combustion Analyzer is a hand-held measuring instrument for the professional flue gas analysis of domestic and light commercial gas and oil boilers and appliances including condensing

boilers and gas heaters.

Sensor: Range (Accuracy):

Temperature: -40 to 600° C

Pressure: ± 40 hPa, ± 16 inwc

Carbon Monoxide: 0 to 4000 ppm

Commercial Toolkit



Commercial Toolkit

Description: Tool kit for commercial energy audits. Included in Commercial Tool Kit:

- 2 ¼" Round Inspection Mirror
- 6 in 1 Nut Driver
- Flicker Checkers
- Fluke Laser Distance Meter
- Extech Illuminance Meter
- Fluke IR Thermometer
- Monarch Strobe Tachometer
- HOBO Data Logger
- HOBO Motor Logger



Tool Type Tool Name & Description

Complete Hose Kit



Complete Hose Kit

Manufacturer: The Energy Conservatory

Description: Colored hoses are used in several building testing protocols to facilitate equipment setup and provide quick identification of pressure input and reference sources. The hose colors provided in the kit are consistent with the Duct Diagnostic Checklist forms and procedures developed by the

Advanced Energy Corporation (AEC).



Tool Type

Tool Name & Description

Data Logger



Elite Pro Power Data Logger
Manufacturer: Dent Instruments

Model: XC

Measures: Voltage, Current, RMS Power, Reactive Power, Displacement Power Factor, Min/Max/Avg

values, Energy

Description: True RMS portable data logging power meter for capturing kWh/kW energy and demand data and also relevant parameters for diagnosing electrical circuit installations. Meter works on single and three phase loads with voltage services of 80 to 600 volts. Measures up to four channels of current from 0 to 6,000 amps.

Uses 333mV current transducers (CTs) and RoCoil CTs, and has 16 mB of memory. USB data interface. Requires ELOG software for launching, viewing real-time data, and downloading data. Kit includes: (3) mini-hinged 20A (CTs), (3) split core small 50A CTs, (3) split core small 100A CTs, (3) split core medium 200A CTs, and either (3) 16" 1000A or (3) 24" 2000A RoCoil Flexible CTs.

Sensor: Range (Accuracy): Voltage: 80 to 600 volts Current: 0 to 6,000 amps

Better than 1% (< 0.2% typical) for V, A, kW, KVAR, KVA, PF

Notes: Power meters must be installed by a licensed, qualified electrician.

Man

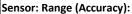
HOBO Data Logger

Manufacturer: Onset Computer Corp.

Model: U12-012

Measures: Temperature, Relative Humidity, Light Intensity, External Sensor

Description: The HOBO Data Logger is designed for interior usage. It tracks over a period of time the temperature, relative humidity and light as well as external sensors in its surrounding. The software allows you to download the information into an excel spreadsheet and calculate the readings. They are good to use inside buildings, crawlspaces, and attics and allow you to see what happens over a period of time. This is a stand-alone data logger with internal sensors monitoring relative light levels, temperature, relative humidity, and one external channel for proprietary temperature thermistors, and current transducers and non-proprietary DC voltage signals. the logger uses a USB interface for data transfer and real-time readings.



- Temperature: -4° to 158° F (± 0.63° F from 32° to 122° F)

Relative Humidity: 5% to 95% (± 2.5% typical, 3.5% maximum from 10 to 90% RH)

Light Intensity: 1 to 3000 footcandles (lumens/ft2)

External: 0 to 2.5 VDC (± 2 mV, ± 2.5% of absolute reading)



MAGlogger Motor Runtime Data Logger

Manufacturer: Dent Instruments

Model: TOUM 3G

Measures: Magnetic Field

Description: MAGlogger is designed to monitor the On/Off status, Time-of-Use operating schedule, and Total On-Time for motors. This stand-alone data logger detects AC-field to determine the ON/OFF status of motorized equipment with an internal magnetic sensor. The non-contact monitoring makes installation simple.

Sensor: Range (Accuracy):

 Magnetic Field: Minimum 40 Milligauss Memory/Records: 8,000 records

Distance Meter



Tool Type

Tool Name & Description



Laser Distance Meter Manufacturer: Fluke Model: 416D Measures: Distance

Description: Hand-held laser distance meter for distance measurements. Calculates areas and

volumes. LCD screen for instantaneous readings.

Sensor: Range (Accuracy):

- Distance: 0.16 to 200 ft (± 0.059 in)

Duct Tester

Minneapolis Duct Blaster

Manufacturer: The Energy Conservatory

Model: with DG-700

Measures: Leakage rate (of duct systems)



Description: The Duct Blaster is a calibrated air flow measurement system used to test and document the air tightness of forced air duct systems in both houses and light commercial buildings. The Duct Blaster fan is directly connected to the duct system, typically at a central return, or at the air handler cabinet. With the remaining registers and grills temporarily taped off, duct air tightness is measured by either pressurizing or depressurizing the duct system and precisely measuring the fan flow and duct pressure. Duct air tightness measurements are used to diagnose and demonstrate leakage problems, estimate efficiency losses from duct leakage, and certify the quality of duct system installation.

Sensor: Range (Accuracy):
-Air Flow: 10 to 1,500 cfm (± 3%)

Title 24 Notes: Instrument meets requirements for duct leakage apparatus air flow rate measurement accuracy and calibration under Title 24, Part 6 and the Residential Appendices Section RA3.1.2 Instrument Specifications.

Exhaust Fan Flow Meter



Exhaust Fan Flow Meter

Manufacturer: The Energy Conservatory

Model: Exhaust Fan Flow Meter

Description: The Exhaust Fan Flow Meter was designed to make quick and accurate measurements of airflow through residential bathroom fans, whole house ventilation fans, and other exhaust devices. Smaller, lighter and easier to use than conventional flow measuring hoods, the Exhaust Fan Flow Meter was specifically engineered to measure flow down to 10 cfm. When the Exhaust Fan Flow Meter is placed over a fan grill, air is drawn through the calibrated opening. The opening is adjusted to minimize back pressure while maximizing accuracy. When used with the TEC DG-700 or DG-3 Digital Pressure and Flow Gauge air flow values directly in cubic feet per minute values can be displayed.

Sensor Range (Accuracy):

Air Flow: 10 to 124 cfm ((± 10%) when used with TEC DG-700 digital pressure gauges



Tool Type

Tool Name & Description

Fogger



Fogger Machine

Manufacturer: Theater Effects

Model: Theatre FX

Description: The Fogger machine can be used in conjunction with the Duct Blaster by pulling the fog smoke into the Duct Blaster fan. The fan sends the fog smoke throughout the entire ducting system and aids in visually pinpointing leakage areas within the ducting system.

Infrared Camera



Infrared Camera
Manufacturer: Flir

Model: i7

Measures: Infrared Radiation Emitted (from an object)

Description: Thermal Imaging or Infrared Cameras assist in detecting missing or low quality insulation, inadequate Heating, Ventilation, and Air Conditioning (HVAC) systems, poor air flow — all are typical problems that cause homes to waste energy. Infrared thermography is the art of transforming an infrared image into a radiometric one, which allows temperature values to be read from the image.

Sensor: Range (Accuracy):

Temperature: -4 to 482°F/-20 to 250°C ((± 2° C or 2% of reading, whichever is greater)



Infrared Camera

Manufacturer: Fluke

Model: TiR

Measures: Infrared Radiation Emitted (from an object)

Description: Thermal Imaging or Infrared Cameras assist in detecting missing or low quality insulation, inadequate Heating, Ventilation, and Air Conditioning (HVAC) systems, poor air flow — all are typical problems that cause homes to waste energy. Infrared thermography is the art of transforming an infrared image into a radiometric one, which allows temperature values to be read from the image. Includes IR-Fusion Technology both in camera and software (combines visible image with IR image in full screen or picture-in-picture views) for easy identification and reporting of problems.

Sensor: Range (Accuracy):

Temperature: -4 to 212°F/-20 to 100°C (± 5° C or 5% of reading, whichever is greater)

Infrared Thermometer



Infrared Thermometer

Manufacturer: Fluke

Model: 62

Measures: Surface Temperature

Description: The infrared thermometer is a non-contact diagnostic tool for quick basic temperature checks in applications where a technician is close to the target object. Simple to use, it enables technicians to discover temperature discrepancies before they become problems. Professionals can troubleshoot maintenance problems by measuring surface temperatures of motors, electrical equipment, insulated walls and pipes, heating, ventilation and refrigeration systems all from a safe distance.

Sensor: Range (Accuracy):

Temperature: -20 to 932°F/-30 to 500°C (50 to 86°F: ± 2°F, Outside 50 to 86°F: ± 3°F or 1.5% of reading

whichever is greater)



Tool Type

Tool Name & Description

Light Meter



Illuminance Meter Manufacturer: EXTECH

Model: EA33

Measures: Illuminance/Light Levels

Description: Hand-held, instantaneous illuminance meter with LCD display measures light levels in footcandles or lux. Option of four different ranges selected with range button. Meter also has data hold button to freeze displayed reading and Max/Min button for storing and recalling highest and

lowest readings.

Sensor: Range (Accuracy):

- Illuminance (Footcandles): 9.999 to 99,990 Fc (± 3% of reading)

Illuminance (Lux): 99.99 to 999,900 Lux (± 3% of reading)

Low-E Coating Detector



Low E Coating Detector Manufacturer: EDTM Model: AE 1601

Measures: Thermal Resistance Coating

Description: The ETEKT + Low-E Coating detector is the industry standard for instruments detecting the presence and location of thermal resistant coatings (Low E) used on energy efficient single and dual lite glass and window assemblies. The ETEKT+ is a rugged handheld device that is accurate, easy to use, and rarely requires calibration. Place the unit flat on the glass surface, press the button and read the results.

Moisture Meter



Moisture Meter
Manufacturer: EXTECH
Model: MO290

Measures: Moisture, Relative Humidity, Air Temperature, Surface Temperature

Description: The moisture meter is used to monitor moisture in wood and other building materials with virtually no surface damage using the pinless moisture sensor (Pin-type Moisture Probe included). It also measures humidity and air temperature with a built-in probe plus non-contact Infrared temperature thermometer. It has a pinless measurement depth to 0.75" (19mm) below the surface.

Measures:

Sensor: Range (Accuracy):

Temperature (Air): -20 to 170°F (± 3.6°F)

Temperature (IR): -4 to 31°F (± 9°F); 32°F (± 2°F); 33 to 392°F (Greater of ± 3.5% or ± 9°F)

Pinless Moisture: 0 to 99.9 (Relative) Pin-type Moisture: 0 to 99.9% (Relative)

Humidity: 0 to 10% (± 3% RH); 11 to 90% (± 2.5% RH); 90 to 100% (± 3% RH)



Tool Type

Tool Name & Description

Plug Load Logger



Plug Load Logger

Manufacturer: P3 International

Model: Kill-A-Watt EZ

Measures: Voltage, Current, Power Factor, Power, Energy

Description: 110V AC plug load logger monitors electrical usage and records and stores energy consumption (kWh) in non-volatile memory, unit retains stored data when unplugged until reset. LCD display shows real time power, voltage, current, and power factor readings and accumulated kWh.

Sensor: Range (Accuracy):

RMS Voltage: 85 to 125 Vrms ($\pm 0.2\%$ Typical, $\pm 1\%$ Max) RMS Current: 0.00 to 15.0 Arms ($\pm 0.3\%$ Typical, $\pm 1\%$ Max) Active Power: 0 to 1875 watts ($\pm 0.5\%$ Typical, $\pm 2\%$ Max) Energy: 0.00 to 9999 kWh ($\pm 0.5\%$ Typical, $\pm 2\%$ Max) Power Factor: 0.00 to 1.00 (± 0.01 Typical, ± 0.03 Max)

Power Meter



True RMS AC/DC Clamp Meter

Manufacturer: EXTECH

Model: 971

Measures: True RMS clamp-on digital power meter that measures watts, current and voltage.

Sensor: Range (Accuracy):

AC Power (50/60 Hz)/DC Power: 0.01 to 40 kW, 10 watt resolution; 40 to 240 kW, 100 watt resolution

 $(\pm 1.5\% + 3 dgts)$

AC Voltage (50/60 Hz): 1 to 600V (±1.5% + 2 dgts)

DC Voltage: 0.1 to 400 V (±1% + 2 dgts)

AC Current (50/60 Hz)/DC Current: 100 mA to 400A (±1.5% + 3 dgts)

Notes: Power meters must be installed by a licensed, qualified electrician.

Pressure & Flow Gauge



Digital Pressure and Flow Gauge

Manufacturer: The Energy Conservatory

Model: DG-700

Measures: Air Pressure

Description: The DG-700 Pressure and Flow Gauge is a multi-functional differential pressure gauge with 2 independent measurement channels. In addition to providing high-resolution pressure measurements, the DG-700 is programmed to operate with other Energy Conservatory test devices to provide airflow measurements during building performance test procedures. The DG-700's dual pressure channels and air flow measurement features make it ideally suited for a wide range of building performance testing applications including:

- Blower Door air tightness testing

- Duct system air tightness testing

- Exhaust fan flow measurements

- Air handler flow measurements

- Building depressurization and combustion safety testing

- Static pressure and velocity measurements using a Pitot tube

Sensor: Range (Accuracy):

-1,250 to +1,250 Pascals or -5 to +5 in. H20 (1% of pressure reading or 0.15 Pa, whichever is greater)

Pressure Pan



Tool Type

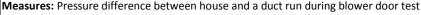
Tool Name & Description



Pressure Pan, Small

Manufacturer: The Energy Conservatory

Model: 12x12x2" Pressure Pan



Description: The Pressure Pan is a duct leakage diagnostic tool which is used along with the Blower Door and digital pressure gauge to identify exterior air leakage in duct systems. This technique involves placing a gasketed Pressure Pan over each register or grille with the air handler fan off and the Blower Door depressurizing the house to a standard reference pressure. A measurement of the pressure between a duct run and the room where the duct register or grille is located provides a quick and reliable indication of whether significant exterior duct leaks exist in that section of the duct system. The pattern of Pressure Pan readings allows for quick identification of major leakage sites, and can be used to tell technicians if they have done a good job of air sealing the duct system. Because the Pressure Pan does not require taping off of registers and grilles, it is an extremely quick diagnostic procedure.



Pressure Pan, Large

Manufacturer: The Energy Conservatory

Model: 22"x22"x2" Pressure Pan

Measures: Pressure difference between house and a duct run during blower door test

Description: The Pressure Pan is a duct leakage diagnostic tool which is used along with the Blower Door and digital pressure gauge to identify exterior air leakage in duct systems. This technique involves placing a gasketed Pressure Pan over each register or grille with the air handler fan off and the Blower Door depressurizing the house to a standard reference pressure. A measurement of the pressure between a duct run and the room where the duct register or grille is located provides a quick and reliable indication of whether significant exterior duct leaks exist in that section of the duct system. The pattern of Pressure Pan readings allows for quick identification of major leakage sites, and can be used to tell technicians if they have done a good job of air sealing the duct system. Because the Pressure Pan does not require taping off of registers and grilles, it is an extremely quick diagnostic procedure.

Solar Shade Analysis Tool



SunEye Shade Analysis Tool Manufacturer: Solmetric

Model: 210

Measures: Shading, Solar Access

Description: The SunEye 210 is an integrated Shade Analysis Tool for solar site assessment. It includes a fisheye camera and a dedicated on-board processor to perform digital image processing and analysis to compute shading and solar access percentages. It includes an electronic compass and inclinometer enabled to measure roof pitch and azimuth along with a built-in GPS.



Tool Type Tool Name & Description

Tachometer



Strobe Tachometer
Manufacturer: Monarch
Model: Nova-strobe dbx
Measures: Rotational rate

Description: Hand-held tachometer uses strobe light to measure rotational speed. An adjustment allows the user to match the Stroboscope flash rate with the rotation. Meter includes analog output

and tripod mount and battery charger.

Sensor: Range (Accuracy):

- Rotational Rate: 30 to 20,000 FPM / RPM (± 0.004% of setting or ± last digit)

Temperature & Humidity Meter



Temperature & Humidity Meter

Manufacturer: Fluke

Model: 971

Measures: Air Temperature, Relative Humidity

The Fluke 971 measures relative humidity and temperature. Through a few easy to use controls, the Meter displays three different temperature points of the air surrounding the meter's sensor: ambient, wet bulb, and dew point.

Sensor: Range (Accuracy):

Temperature: 32°F to 113°F (± 1.0°F); -4 to 32°F and 113 to 140°F (± 2.0°F)

Relative Humidity: 5% to 95% RH; 10% to 90% RH (± 2.5% RH); <10% >90% RH (± 5.0% RH)