Southwest Air Conditioning

SWEEP 2012

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Southwest Climate AC Research

1993 Proctor Engineering Hot Dry Project for Pacific Gas and Electric Co.

2006 Proctor Engineering Hot Dry Project for California Energy Commission

2012 Proctor Engineering Hot Dry Project for the Kingdom of Saudi Arabia
Air Conditioning is the Load from Hell

Air Conditioning is the Cause of Peak Electrical Consumption and Peak Costs
Air Conditioners are Designed and Installed the Same for Florida and Arizona

It makes no sense --- since Florida and the Southwest have different climates and different cooling needs.
There are 2 kinds of cooling

Sensible Cooling which
Reduces the Temperature
And is needed in Spades in the Southwest

Latent Cooling which
Removes Moisture
And is much needed in the East
Obtaining Sensible Cooling Efficiency (Sensible EER)

1. CheckMe!® Quality Assurance process to ensure savings

2. Don’t dehumidify
   Increase airflow to 350 or more CFM per ton
   i. Achievable in most SW systems
   ii. Return upgrade is the best way to increase airflow

3. Evaporate water off the inside coil when the compressor shuts off
   i. The Western Cooling Control™ (WCC™)
Western Cooling Control™

- Compressor on Fan on
  - On time logged
- Compressor off Fan on
  - Time varies with logged compressor time
  - Evaporates water off the coil = Cool air

Over 30,000 successfully installed
Independent Assessment of the Western Cooling Control ™

“Results from this demonstration, supported by extensive laboratory testing, confirmed energy savings averaging 16 percent.”
Obtaining Sensible Cooling Efficiency (Sensible EER)

4. Install a high efficiency (BPM) fan motor

5. Eliminate duct leaks (critical with attic ducts)

6. Eliminate bypass ducts in zoned systems
What is a Concept3® Motor?

• It is a brushless permanent magnet (BPM) AC/furnace retrofit motor

• It is an electrically commutated motor (ECM)

• It has the Western Cooling Control integrated into it’s electronic brain
Fan Watts at Same Cooling CFM

Fan Motor Power
BPM Motor Retrofit
at Matched Pre-Post Airflow

Average Reduction 47%
Savings

• Heating Fan Energy  50%
• BPM Cooling  8% to 11%
  (duplicate CFM)
• Cooling Southwest Climate  24%
Duct Leakage Tests – Phoenix
(Measured Cooling Load, BTUh)

- 16% Supply Leakage, 11% Return Leakage
- 2% Supply Leakage, 11% Return Leakage
- 2% Supply Leakage, 3% Return Leakage
Typical Dampered Multi-Zone AC System With Bypass Duct
Obtaining Sensible Cooling Efficiency (Sensible EER)

7. Diagnose and repair significant AC problems
   7. Refrigerant levels with more than 5% efficiency effect
   8. Minor airflow repairs

8. Screen existing units for low operating efficiency
   i. Replace Energy Hogs with high efficiency units

9. CheckMe! Quality Assurance process to ensure savings
What is CheckMe!®?

• CheckMe! is a quality assurance process for the most difficult conditions for obtaining quality
  – Thousands of technicians all working at different places
  – Hundreds of contractors with little or no quality assurance or quality control
The CheckMe! Process

• Technician hands-on training (4 to 1 ratio)
• Initial test reported to a Person using an artificial intelligence expert system
• Immediate repair, retest, report and feedback
• Immediate expert human assistance during process
• Immediate capture and analysis of results
• Targeted and random inspections
• Action including retraining, suspension, and removal from program
• Customer satisfaction 97% Good or Excellent
Leo Wong, Project Leader with NV Energy

• "This program first started in the 1990's"
• In 2011-2012 Proctor Engineering Group's CheckMe! Plus replaced the existing program.
• “to become one of the most cost-effective programs in our company's portfolio of residential programs."
What is CheckMe! Plus?

A comprehensive residential and commercial HVAC program including:

i. The CheckMe! quality assurance system
ii. Diagnosis and Efficiency Screening
iii. Targeted AC repairs
   - Refrigerant correction
   - Minor airflow corrections
iv. Early replacement of Energy Hogs
v. Airflow increase
   - Return upgrades
   - Bypass elimination
vi. Duct testing and sealing
vii. Western Cooling Control
viii. BPM high efficiency motors
ix. Commercial AC controls
x. Heat Pump controls