



# Standards for Evaluating RTU FDD Systems

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- ASHRAE SPC 207P Committee

# Outline

- Why is Lab Evaluation Important?
- RTU FDD in California's Title 24 Building Code
- ASHRAE Method of Test for RTU FDD
- Future Work
- Conclusions

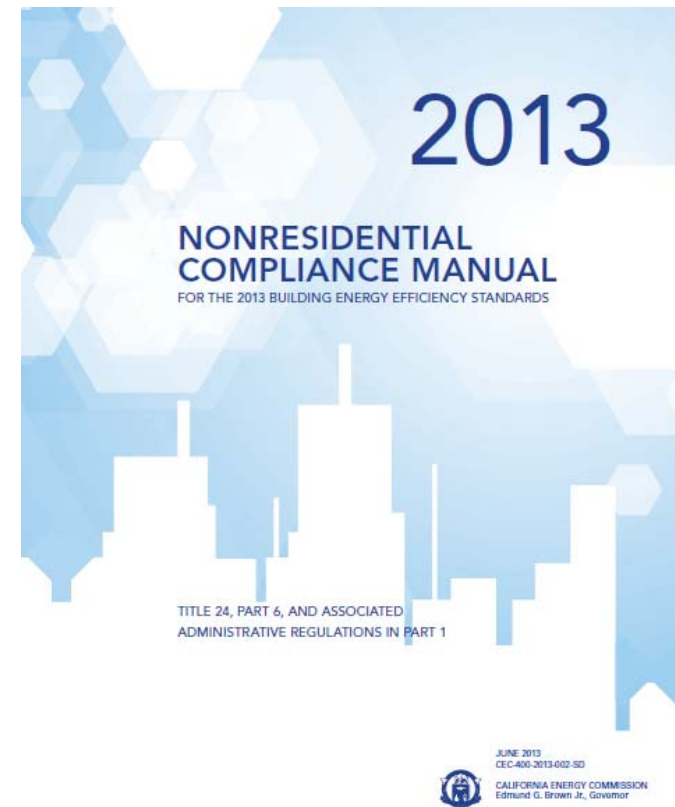
# Why is Evaluation Important?

- ▶ It's the Wild Wild West out there!
- ▶ How do you know you're getting something valuable?
- ▶ Enables specifications of functionality and performance for:
  - Building codes.
  - Marketing.
  - Utility incentive programs.
  - Procurement guidelines.
  - Requirements in rating systems.
  - Design tools.
  - Alignment of the development of products to encourage competition.



# RTU FDD in California's Title 24\*

- As of July 1, 2014, all air-cooled unitary DX units with an economizer and mechanical cooling capacity  $\geq 4.5$  tons shall be equipped with FDD (mandatory requirement).
- The FDD system shall detect the following faults:
  - Air temperature sensor failure/fault
  - Not economizing when it should
  - Economizing when it should not
  - Damper not modulating
  - Excess outdoor air
- Faults must be annunciated off the roof (EMS, thermostat, remote application).



*\*Also appears in International Energy Conservation Code*

# Testing Required for RTU FDD in 2013

## Title 24

- Contractors must conduct in-field acceptance testing to confirm the diagnostic is correctly installed.
- Manufacturer must certify lab validation of the diagnostic functionality and performance.
  - No specified test standard, currently.
  - Right now 48 products from 9 manufacturers are certified.
  - More expected soon!

# ASHRAE Method of Test for FDD

- SPC-207P launched in 2012
- Public Review Draft by Jan '15
- SPC-207P Committee:
  - General (9)
  - Producers (8)
  - Users (5)
- WHPA FDD Committee:
  - ACCA
  - AHRI (2)
  - FDD Vendor (6)
  - RTU OEM (5)
  - End User
  - Consultant (6)
  - Researcher (8)
  - Utility (9)
  - CEC



BSR/ASHRAE Standard 207P

Internal Draft

**Laboratory Method of Test of Fault  
Detection and Diagnostics Applied  
to Commercial Air-Cooled  
Packaged Systems**

6/21/14 DRAFT

First Public Review (January 2015)  
(Draft Shows Complete Proposed New Standard)

# Some Details of SPC-207P (DRAFT)

- “Method of Test” of FDD, not a Standard for FDD
- Standardized lab tests, performed by manufacturer
- Includes definitions and detailed tests for Economizers, Refrigerants, and Air-Flow FDD
- Verifies manufacturer’s claim
- Does not set a performance criteria: that is for standards and specs to decide (eg, T24)
- Defines “Fault Intensity” and “Fault Impact”
- Applies to integrated FDD, strap-on FDD, remote monitoring, and hand-held solutions
- Tests are defined only for “snapshot” methods

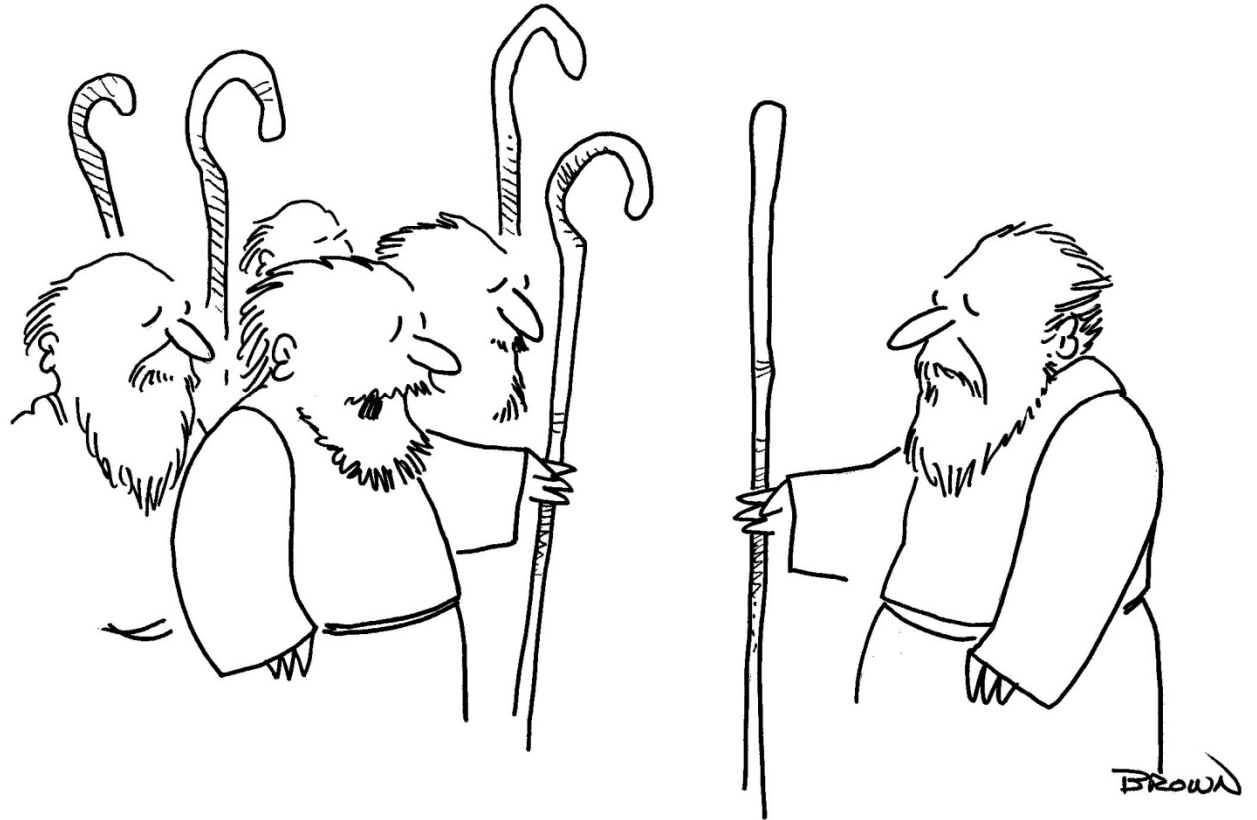


# Specification of Performance

- Claimed fault
- No-fault intensity threshold
- Fault intensity threshold
- Range of driving conditions
- *Coincident fault (optional)*
- Whether the testing shall be done and/or witnessed by a neutral third party.

# Dangers of Standardization

- Can be gamed.
- Can favor specific tools or approaches.
- Can drive development of technology in a particular direction.
- Can recognize only past developments, not innovation.



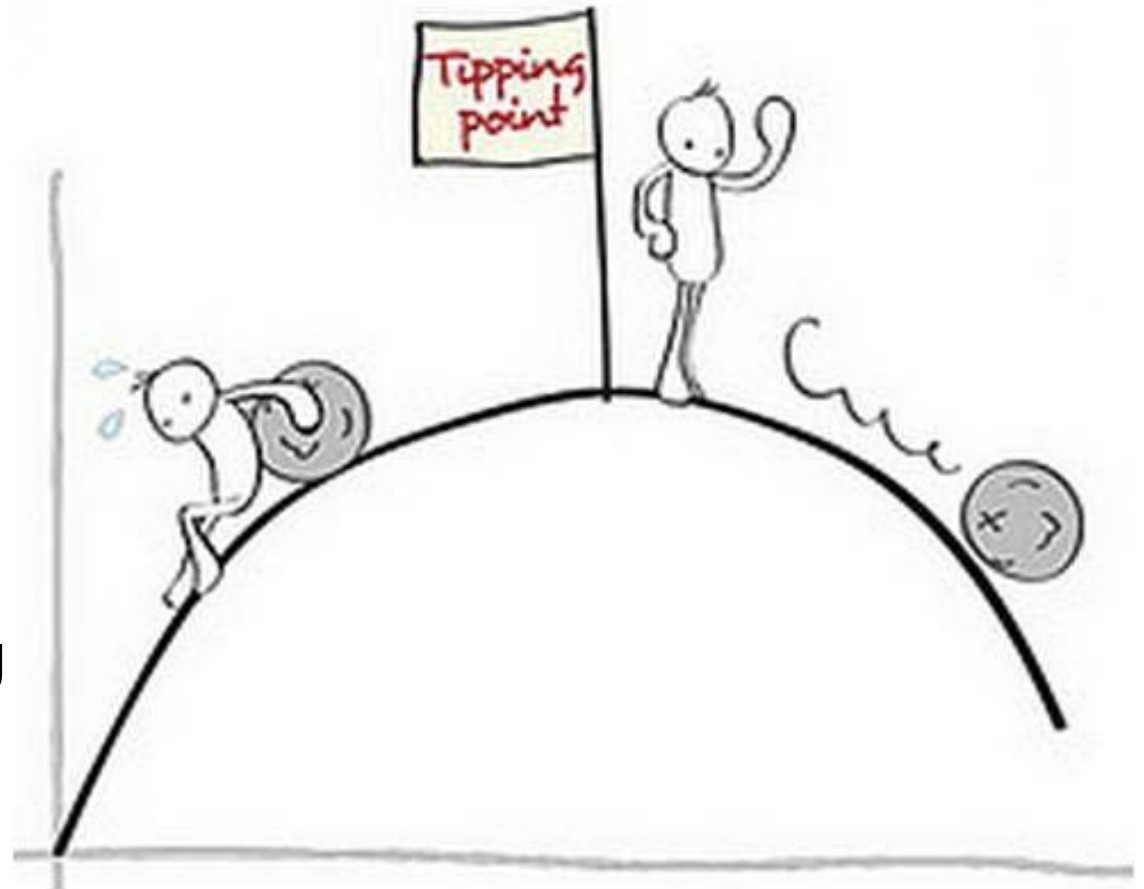
“I’m sorry but this is a staff meeting and that is obviously a rod...”

# Future Work

- Define T24 lab and field tests
- Validate SPC207P lab tests
- Develop specifications for tests of learning algorithms
- Develop FDD methods and Methods of Test for other systems and technologies (AHU's, microchannel, evap condensers and precoolers, residential split systems...)
- Develop FDD methods and Methods of Test for other types of faults (efficiency degradation, commissioning faults...)
- Implement other standards (ASHRAE 90.1 and 89, Green Mechanical Code ...)

# Conclusions: What Does the Future Hold?

- Find ways to differentiate and recognize innovation
- Behavior and FDD
- Standardization and great R&D have helped move FDD technology forward...
  - ...towards a tipping point?



# Questions, Comments, Discussion

- Thank you!

