The Workforce Guidelines for Home Energy Upgrades

or

No, REALLY we’re from the Government and we’re here to help

Richard ‘Doc’ Knaub
Project Leader
Weatherization & Workforce Development
T- 303-275-3261
Richard.knaub@nrel.gov

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Richard ‘Doc’ Knaub

Dr. Richard Knaub is a Project Leader in Weatherization & Workforce Development, at the National Renewable Energy Laboratory. He has been actively participating in the Weatherization training and standards development both at the state and national level for the last several years. In addition to teaching about energy efficiency and renewable energy at the community college level, he’s been involved with community development, educational and sustainability activities in New York, Kentucky, Tennessee, and Colorado.
Abstract

The concept of Standard Work Specifications (SWSs) is a pretty simple one. That there is a right way and a wrong way to do something and doing it the right way is better. The obvious benefit is consistently higher quality work with greater efficiency. Many companies and industries are developing SWS’s because these two basic benefits. When correctly applied, standard work will not only sustain continued quality improvement, but also expose and eliminate previously unseen waste. So this means the workforce need to be able to work up to the level of the SWSs. The goal of the Workforce Guidelines for Home Energy Upgrades is to give the industry the support it needs to improve work and worker quality so that the consumer has confidence in the industry.
How Many of you change your own oil?
What do you expect when someone else changes it?

At the Minimum:

- ✓ Drain the old oil
-   ➢ Catch the oil for recycling
- ✓ Remove the old oil filter
- ✓ Install the new oil filter
-   ➢ Replace the drain plug
- ✓ Refill the engine oil
- ✓ Check the oil level
- ✓ Wipe any oil or grease off the body
Two Parts

1. Specific instructions as to what needs to be done
2. Someone who can follow those specific instructions
A Standard Work Specification

In its simplest form:

A simple written description of the safest, highest quality, and most efficient way known to perform a particular process or task
Qualified Worker

Trained to work to the level of the Standard Work Specification
Take it out to the market:

The Customer Knows What to Expect

**At the Minimum:**

**Trained** workers who will

- ✔ Drain the old oil
  - ✔ Catch the oil for recycling
- ✔ Remove the old oil filter
- ✔ Install the new oil filter
  - ✔ Replace the drain plug
- ✔ Refill the engine oil
- ✔ Check the oil level
- ✔ Wipe any oil or grease off the body
2 of the 3 Barriers to Growth of the Home Performance Market*

Lack of Straightforward and Reliable Home Energy Retrofit Information

The consumer needs to be able to tell what measures will provide what savings and what measures are being offered by each contractor.

Lack of trained workers capable of performing to nationally recognized standards of work consistent with the customer expectations.

*Recovery Through Retrofit
What are the Guidelines

The Guidelines

Workforce

- Job Task Analyses
- Essential Knowledge, Skills, and Abilities

Work

- Technical Standards Reference Guide
- Standard Work Specifications

Workforce Guidelines for Home Energy Upgrades
The What and Why of Standard Work Specifications

• A simple written description of the safest, highest quality, and most efficient way known to perform a particular process or task
• The only acceptable way to do the process it describes
• Expected to be continually improved
• Includes the amount of time needed for each task
• Reduces variation, increases consistency
• Needed in all work areas

• Helps budget for time, materials and insurance. Helps marketing and sales
• No surprises in budget or insurance claims
• Regs change, materials and tools change
• Time is money, estimating is an art
• Quality control improves customer satisfaction
• Reduces waste increases profit
Only works if the workers follow SWSs

Every worker need to:

1. Understand why he or she must follow the standard work
   - Quality control
   - Cost control
   - Liability
   - Safety
2. Be willing to follow the standard work
   - Or go somewhere else
3. Knows the consequences for choosing not to follow standard work
   - Could kill someone
4. Follow the process for changing standard work
   - Sometimes you need a work-around
The Goal of the Standard Work Specifications

- Increased customer satisfaction and improved customer understanding
- Increased productivity
- Increased profits
- Decreased liability
- Decreased waste
SWS Development Timeline

March 2010
Establish Process to Develop Workforce

June 7–11
1st draft Standard Work Specifications (SWS)
60 Experts

July 7–9
Technical Reviews:
• WAP
• Healthy Homes
• Worker Safety
51 Experts

June 2011
Issue Final Guidelines

July 26 – August 9
SWS Industry Review
Check it out!

August 16 – October 26
OMB and Agency Review

Winter 2010/2011
Incorporate Public Comments

November 9
VP Announcement and Public Comment Period Begins
SWS Industry Review

July 26 – August 9, 2010

100+ Reviewers from Industry
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August 16 – October 26, 2010

– Comments from
  • Council on Environmental Quality
  • Department of Agriculture
  • Department of Education
  • Department of Labor
  • Department of Health and Human Services
  • Department of Housing and Urban Development
  • Environmental Protection Agency
  • Equal Employment Opportunity Commission

– Detailed Response to Office of Management and Budget
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Summer 2010
Incorporate Public Comments
995 comments
Over 100 individuals

June 2011
Issue Final Guidelines
SWS Table of Contents

Section 1: Home Performance Assessment
Section 2: Combustion Appliances
Section 3: Ventilation
Section 4: Air Sealing
Section 5: Heating and Cooling
Section 6: Insulation
Section 7: Crawl Spaces and Basements
Section 8: Baseload
Glossary
Appendix D: Technical Standards
Attic Sealing

Penetrations and Chases:
4) Penetrations
5) Chase Sealing
6) Chase Capping
7) Pocket Door

Open Stairwells:
8) Interior with Sloped Ceiling
9) Stairwell to Attic - Door at Bottom with No Ceiling Above
10) Stairwell to Attic - Door at Top with Finished Ceiling Above

Dropped Ceilings and Soffits:
11) Raised Top-Plate with Walls Open to Attic
12) New Ceiling Below Original - Old Ceiling Intact or Repairable
13) Above Closets and Tubs
14) Ceiling Leaks Not Repairable – No Air Barrier Above
15) 3-D Walls
16) Dropped Ceiling with Light Boxes and Fixtures
17) Dropped Soffits

Other Ceiling Types:
18) Tongue and Groove Ceilings
19) Cathedralized Attic Ceilings

Considerations:
1 Appendix D – OSHA Personal Protective Equipment Standards
## Draft SWS: Attic Insulation Prep Detail—Knee Wall

<table>
<thead>
<tr>
<th>Specification(s)</th>
<th>Objective(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All knee walls will have a top and bottom plate or blockers installed using a rigid material</td>
<td>Eliminate bending, sagging or movement that may result in air leakage</td>
</tr>
<tr>
<td>All joints, cracks and penetrations will be sealed in finished material including interior surface to framing connections</td>
<td>Prevent air leakage through the top or bottom of the knee wall</td>
</tr>
</tbody>
</table>

### Table:

<table>
<thead>
<tr>
<th>Row</th>
<th>Title</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knee wall prep for batts</td>
<td>All knee walls will have a top and bottom plate or blockers installed using a rigid material</td>
</tr>
<tr>
<td>2</td>
<td>Installation</td>
<td>All joints, cracks and penetrations will be sealed in finished material including interior surface to framing connections</td>
</tr>
<tr>
<td>3</td>
<td>Backing knee wall</td>
<td>Insulation will be installed using one of the following</td>
</tr>
</tbody>
</table>

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33 ASTM E1186 - 03(2009)
# Attic Air Sealing: Penetrations

<table>
<thead>
<tr>
<th>Technical Standard</th>
<th>Standard Work Specifications</th>
<th>Knowledge, Skills, Abilities</th>
</tr>
</thead>
</table>
| International Residential Code (Ch. 3, 6, 7, 8, 11, 31) | **Backing and Infill**  
• Provide backing or infill as needed to meet specified characteristics of the selected material and the hole  
• Infill will not bend, sag, or move once installed  
• **Objective:** Hole size small enough to use sealant, closure is permanent and supports any load  
**Sealant Selection**  
• Materials adhere and are continuous with intended surfaces, and meet ignition barrier requirements  
• **Objective:** Permanent; meet/exceed performance characteristics of surrounding materials  
**Insulation**  
• Use only non-combustible materials in contact with chimneys, vents, and flues  
• **Objective:** Do not create a fire hazard | • Ability to read and follow directions  
• Physical ability to climb ladders and work in enclosed spaces  
• Tolerance to heat and cold extremes  
• Knowledge and ability to identify and differentiate building elements including framing, plumbing, electrical, insulation, sheathing, HVAC, fasteners  
• Understanding of basic building science, including aligning barriers, stack effect, moisture transfer  
• Knowledge of and ability to install sealants, including methods and requirements  
• Ability to use tools including a tape measure, utility knife, hand and power saws, caulk and foam guns  
• Ability to recognize hazardous conditions requiring special treatment |
| International Energy Conservation Code (Ch. 4) | |  
| ASHRAE (62.2, 119, 136) | |  
| ASTM (C509, C920, C1363, C1642, C330M, E84, E779, E814, E2178) | |  

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**NATIONAL RENEWABLE ENERGY LABORATORY**

*Innovation for Our Energy Future*
Four Home Energy Retrofit Job Classifications

Inspector
Auditor
Crew Leader
Installer
Job Task Analysis (JTA)

Identifies and inventories a job’s critical tasks.

For a given job, a formal process for determining and cataloguing what a worker does.

Tasks are classified as either cognitive or psychomotor skills, and as critical, very important, and important for job performance.

Examples: set up blower door, run test in accordance with ASTM E779, record results of blower door test, diagnostic software, etc.
Essential KSAs

Identify the minimum *knowledge, skills, and abilities* that workers should possess to perform high-quality work

Each Job Task has a corresponding set of essential KSAs

Examples:

- Demonstrate ability to blow insulation at appropriate air pressure and material quantity to ensure complete coverage and manufacturer’s recommended density to achieve prescribed R-value

- Demonstrate ability to prioritize air sealing measures to inhibit moisture migration into attics and other interstitial spaces

- Demonstrate knowledge of basic building science, including aligning barriers, stack effect, moisture transfer
Industry Involvement

- Drafting SWS
  - 60 Technical Experts

- Technical Reviews
  - 80 Experts

- Drafting JTA/KSAs
  - 50 Technicians

- Webinar Series
  - Industry Feedback

- JTA/KSA Validation Survey
  - 892 Reviews

- JTA/KSA Review
  - 50+ Workforce Experts

- Industry Technical Review
  - 100+ reviewers

- June–July
  - Drafting SWS
  - Technical Reviews

- June–July
  - Drafting JTA/KSAs

- July–December
  - Webinar Series
  - JTA/KSA Review

- July–December
  - Industry Technical Review

- March 2011 to March 2012
  - JTA/KSA Validation Survey
  - Implementation
  - Public Comment Period
  - Implementation Strategies

- Federal Register Notice

NATIONAL RENEWABLE ENERGY LABORATORY
Innovation for Our Energy Future
Validation Survey

• Open for 2 weeks

• Mailed to over 2000 people

• 892 Responders
  – Crew Leader = 115
  – Installer = 107
  – Auditor = 483
  – Inspector = 187
Questions?

Sign up for project updates

http://www1.eere.energy.gov/wip/retrofit_guidelines_overview.html