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HIGH PERFORMANCE WALLS

Nick Brown

President, Merlex Stucco

Vice President, Stucco Manufacturers Association

CABEC Certified Energy Analyst



Pace of Adoption will Accelerate

- Currently, a minority of California homebuilders are using exterior continuous insulation (CI) to differentiate on energy efficiency
- 2016 energy code will significantly change calculations on walls
- Other alternatives to CI that worked in 2013 code to achieve compliance will not be available with 2016 standards
- How to comply



Where We Are Today

- Many CA homebuilders using 2x4 wood framing & R-13 batts in walls
- Standard from 2013 energy code is R-13 + R-5 continuous insulation
 - Making up for the shortfall on the walls in other areas of the home
- 3-coat stucco remains dominant in SoCal & Bay Area new home construction
- 1-coat (CI) stucco becoming more common in more extreme climates (AZ, NV, Sacramento, Inland Empire)
- Plasterers' bids in 3-coat markets are typically 5-10% higher for 1-coat than 3-coat stucco

Case Study: the Impact of Tankless Water Heater

- Standard 2,400 sqft 2-story in Norco (CZ10)
- Impact of tankless WH is 3-4 TDV kbtu/sqft or 3-4%
- Impact of 1-inch CI is 5 TDV kbtu/sqft or 5%
- Tankless makes up for leaving out CI stucco



Coming 2016 Wall Standards

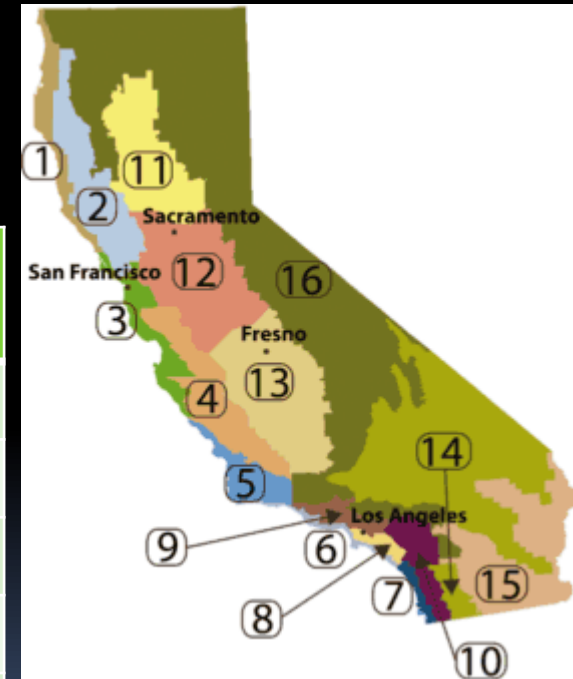
- Current 2013 vs 2016 wall insulation standards

Climate Zone	2013 Residential	2016 Residential
6,7 (Coastal SoCal)	.065	.065
All Others	.065	.051

Table 1: Wall U-factors for Low-rise Residential Construction – wood framing

Climate Zone	2013 High-Rise Residential	2016 High-Rise Residential
1,5,8 (Coastal)	.102	.059
3,6,7 (Coastal)	.110	.059
2,4,9,10,12,13 (Valleys)	.059	.059
15 (Socal deserts)	.042	.042
11,14,16 (Inland NoCal, Inland SoCal, Sierras)	.059	.042

Table 2: Wall U-factors for High-Rise (>3 stories) Residential Construction – wood framing



Assemblies that Meet Code

- Wall assemblies that meet 2013 & 2016 standards

	2013 U & Assembly	2016 U & Assembly
CZ 6,7 LRR (Coast SoCal)	0.065: 2x4, R-13 + R-5 CI OR 2x4, R-15 + R-4 CI	same
All others LRR	0.065: 2x4, R-13 + R-5 CI OR 2x4, R-15 + R-4 CI	0.051: 2x6, R-19 + R-5 CI OR 2x6, R-21 + R-4 CI OR 2x4, R-15 + R-8 CI
CZ 1,3,5,6,7,8 HRR (Coastal)	0.102 or 0.110: 2x4, R-13	0.059: 2x6, R-19 + R-2 CI OR 2x4, R-15 + R-6 CI
CZ 11,14,15,16 HRR (Inland)	0.059 or 0.042: 2x6, R-19 + R-2 CI	0.042: 2x6, R-19 + R-10 CI OR 2x6, R-21 + R-8 CI
CZ 2,4,9,10,12,13 HRR	0.059: 2x6, R-19 + R-2 CI	0.059 (no change)

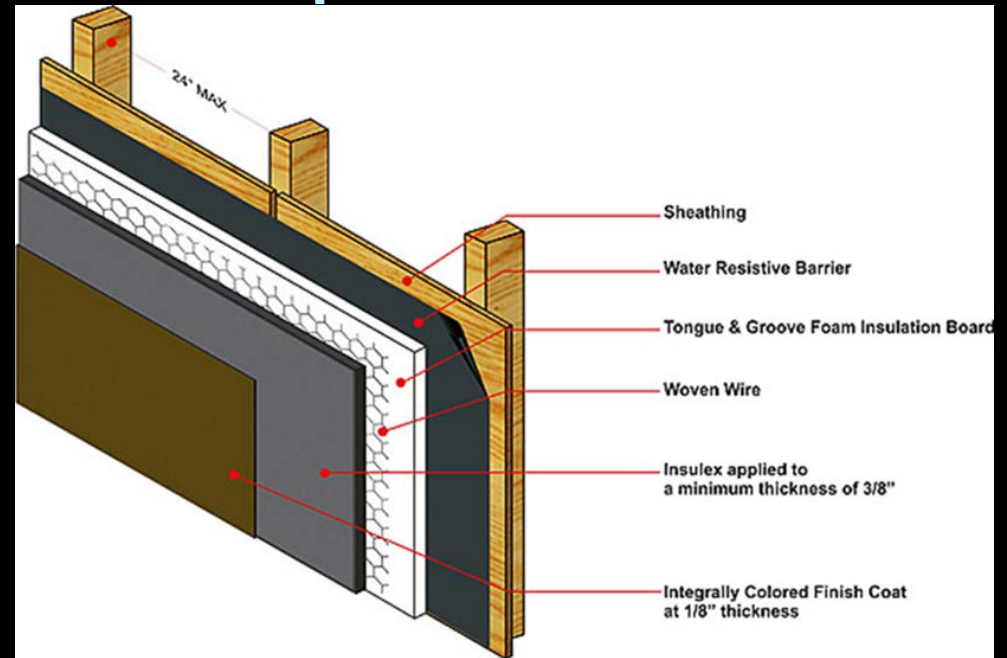
How to Build with 2016 Compliant Walls

- Status Quo: what other measures in home would it take to compensate for R-13 & 2x4 walls without CI?

Climate Zone	U-factor 2016	Energy Penalty	Measures Required
Coastal LRR	0.065	5.6%	Tankless WH ef=0.95
Most HRR	0.059	6.8%	QII, Tankless WH ef=0.78
Most LRR	0.051	7.9%	QII, Tankless WH ef=0.95
Extreme HRR	0.042	9.0%	QII, Air Sealing 3 ACH, Tankless WH

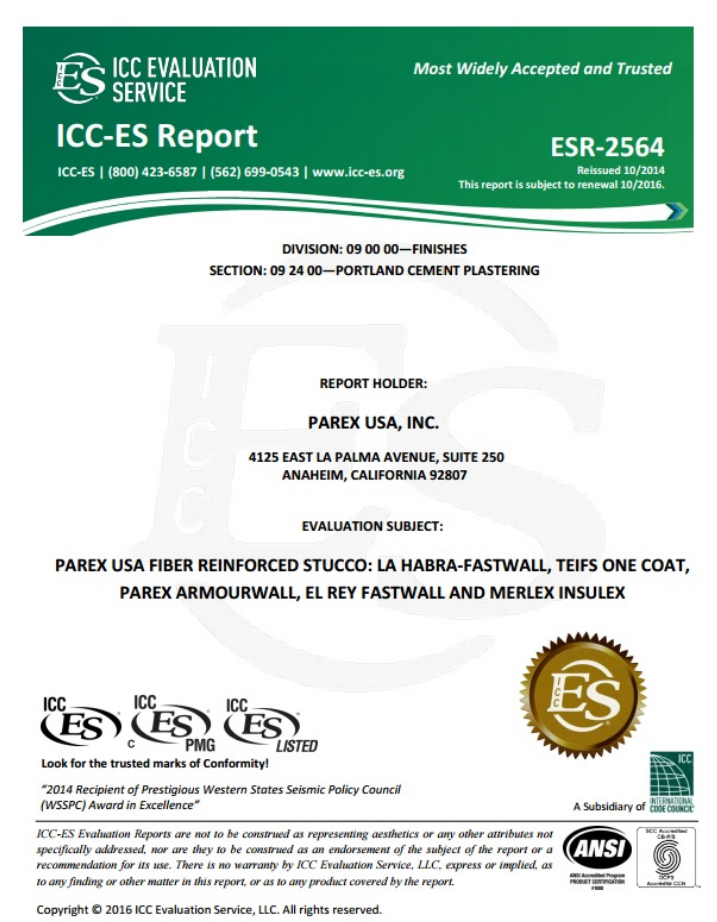
How to Build with 2016 Compliant Walls

- CI wall construction
 - “One Coat” Stucco
 - Siding over foam board
 - SIPs/ICFs not yet mainstream
- “One Coat” Stucco
 - Same hard cement stucco that is dominant in California 3-coat work
 - Applied over lath, WRB, just with 1” to 1.5” of EPS foam sandwiched inside assembly



One Coat Stucco

- Assembly diagram
- Differences from 3-coat stucco
 - Foam board attached to studs with metal lath attached through foam to studs
 - Foam board is T&G with WRB under it
 - Windows are 5/8" deeper to account for foam thickness
 - Trims are 5/8" deeper (weep screed, expansion joints, Milcore)
 - Manufacturers' ICC reports provide full specification for application
- Established standard method in many markets (AZ, NV, Sacramento)



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PAREX USA, INC.
4125 EAST LA PALMA AVENUE, SUITE 250
ANAHEIM, CALIFORNIA 92807

EVALUATION SUBJECT:
PAREX USA FIBER REINFORCED STUCCO: LA HABRA-FASTWALL, TEIFS ONE COAT,
PAREX ARMOURWALL, EL REY FASTWALL AND MERLEX INSULEX

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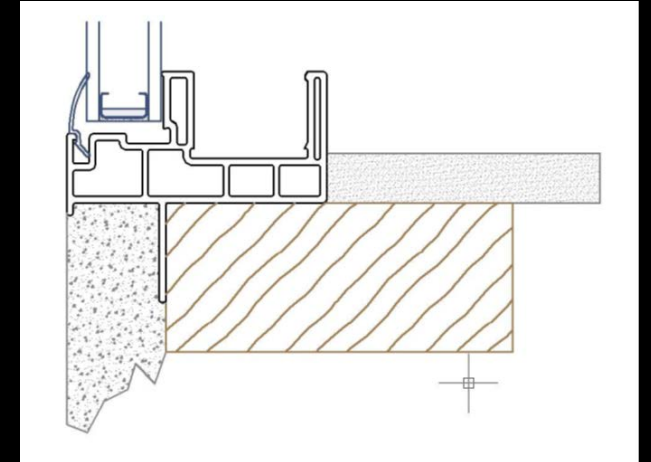
Benefits of One Coat Stucco

- Eliminates thermal bridging
- Eliminates need for scratch coat
 - “It shaves off about a week because of the cure time for the brown coat” – Jared Hendricks, Meritage Homes Purchasing Manager
- Reduces cement pump blowouts over open framing

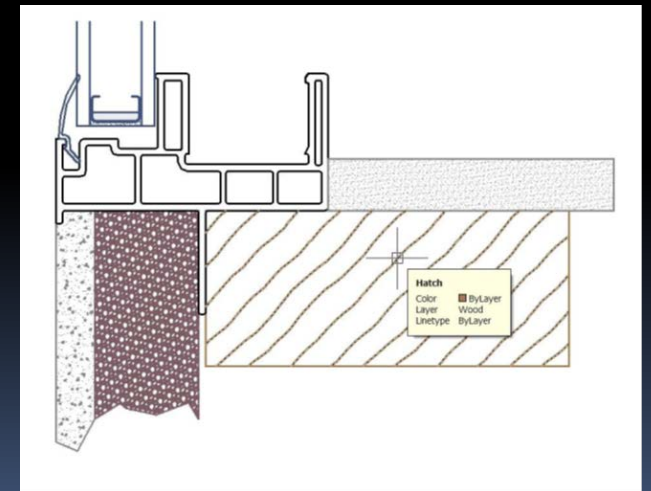


How to Specify One Coat Stucco

- Dictate use of 1-3/8" one-coat window nailing fins
- Dictate use of 1"-1.5" insulation board
 - EPS, XPS, Polyiso, Mineral wool
- Dictate use of 1-3/8" weep screed and other trims
- Work with plasterers on best practices for foam and lath installation
- Work with framers to ensure straight surface to leave plasterer



Traditional 3-coat nailing fin



Modified 1-coat nailing fin




Barriers to Adoption of One Coat Stucco

- Inertia
- Higher plasterer bids
- Easier Title 24 compliance options in 2013 energy code
- High-Rise Residential: Assembly fire test (NFPA-285) required over 3 stories with one-coat
 - Not required with 3-coat stucco

Other Alternatives to Comply

- HERS Measures
 - Advanced Framing
 - Air Sealing (3 ACH is worth 5 TDV kbtu/sqft in Norco house or 5%)
 - Quality Insulation Installation (QII) is worth 5 TDV kbtu/sqft or 5%
 - Refrigerant charge verification is worth 5 TDV kbtu/sqft or 5%
- More efficient HVAC systems, water heaters, etc.



My Prediction for 2017-2020

- By 2018, most SoCal homebuilders will switch to CI and one-coat stucco
 - Forced to choose between one-coat stucco and HERS measures to comply
- Quality-oriented builders will upgrade lath and cement base coats to achieve better results
- Thicker plaster trims and window frames will become common
- Plastering contractors will adapt or lose volume