



California Building Industry Association (CBIA)

Knauf Insulation

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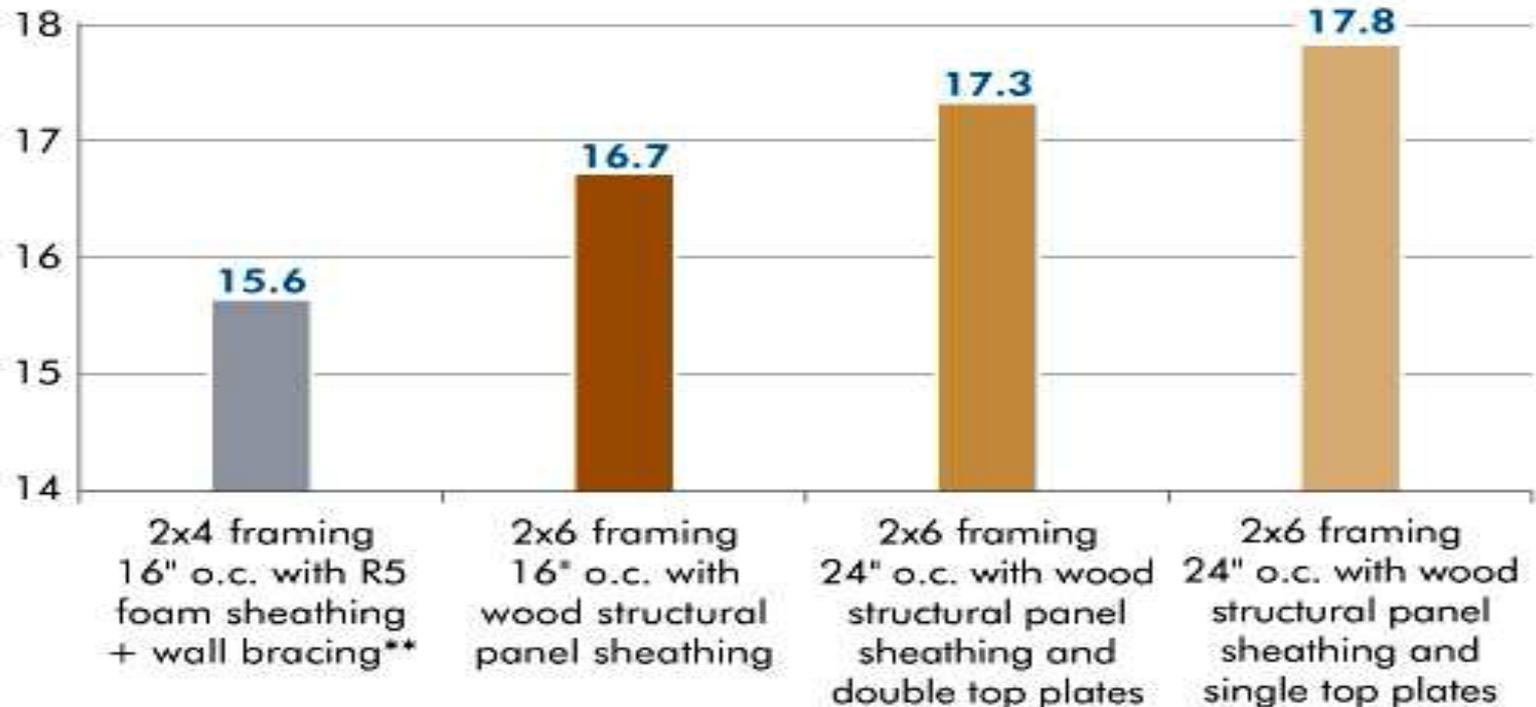
503-927-4580

Current July 1, 2014 CEC Title 24

Residential Requirements			Climate Zone																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
Building Envelope	Insulation ¹	Roofs / Ceilings	U 0.025 R 38	U 0.031 R 30	U 0.025 R 38																
		Walls	Above Grade	2x4 Framed ²	U 0.065 R 15+4 or R 13+5																
				Mass Wall Interior ³	U 0.070 R 13	U 0.070 R 13	U 0.059 R 17														
			Below Grade	Mass Wall Exterior ³	U 0.125 R 8.0	U 0.1025 R 8.0	U 0.125 R 8.0	U 0.070 R 13													
				Below Grade Interior ³	U 0.070 R 13	U 0.070 R 13	U 0.066 R 15														
		Floors	Slab Perimeter	Below Grade Exterior ³	U 0.200 R 5.0	U 0.100 R 10	U 0.100 R 10	U 0.053 R 19													
				Raised	NR	NR	U 0.58 R 7.0														
			Concrete Raised	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19															
		Radiant Barrier			NR	REQ	REQ	NR													
		Roofing Products	Low-sloped	Aged Solar Reflectance	NR	0.6	NR	0.6	NR												
Thermal Emittance	NR			NR	0.75	NR	0.75	NR													
Steep Sloped	Aged Solar Reflectance		NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	0.20	NR		
	Thermal Emittance		NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	0.75	NR		
Fenestration	Maximum U-factor ⁴		0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32			
	Maximum SHGC ⁵		NR	0.25	NR	0.25	NR	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25			
	Maximum Total Area		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%			
	Maximum West Facing Area		NR	5%	NR	5%	NR	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%			

Advanced Framing Vs. Standard

WALL SYSTEMS THAT MEET R20 WALL REQUIREMENTS* (Whole Wall R-value Comparisons)



*Evaluation based on uninsulated headers and R21 cavity insulation in 2x6 walls.

**Represents a typical foam sheathed wall meeting R20 requirements in accordance with the 2012 IECC, Table R402.1.1. Assumes 40% structural wall bracing covered with R2 foam sheathing.

http://www.performancewalls.org/?content=app_pf_afadvantages

Conventional vs. Advanced Framing

- C** 2x4 frame @ 16 inch centers w/ double top plates
- C** Three stud corners
- C** Jack studs, cripples and double headers

Is being replaced by:

- A** 2x6 frame @ 24 inch centers w/ single top plates
- A** Two stud corners
- A** No jack studs or cripples
- A** Single headers or no headers at all

Advantages of Advanced Framing

- It is **cheaper** and faster to build;
- Uses 5 to 10 percent **less lumber (board-feet)**;
- Faster because it uses **30 percent fewer pieces**;
- Provides a **60 percent deeper cavity** allowing **60 percent more cavity insulation**;
- Reduces the framing factor from **25 percent to 15 percent**;
- **Utility & other (mechanical) services are easier to install**;
- **Joists, studs & rafters or trusses line up for cavities & chases to be aligned.**

Advanced Framing



Ecobatt with Ecosse Technology

- R-15 High Density batt for 2 X 4 walls
- R-21 and R-23 High Density batts for 2 x 6 walls
- Ecosse Technology eliminated all chemicals from material went to bio-based binder in 2009
- Lake Shasta Plant 65% -70% post consumer glass- Highest in US



Knauf Jet Stream Net and Blow Application



Knauf Jet Stream Blowing Wool

- Third Party verification of 1.5% settling over a 20 year period
- Improves STC 4 to 10 points
- Each bag equivalent to 46 recycled bottles
- Greenguard Gold Certified
- Will not sustain microbial growth- ASTM C 1338



Advantages of a Net and Blow System

- More R-Value per sq in than batts- R4.2 vs R3.6
- Can achieve an R-23 in 2x6 walls
- Higher STC Rating due to filling all voids and gaps
- Easier to achieve a Grade 1 Install than batts –
- Important to note that QII is more prevalent in California now, so batt Grade 1 is more challenging
- Material is pure virgin glass mineral wool
- Can be installed in any application- walls, ceilings, floors, ect.
- Performs as well as any high performance insulation product on the market- ref: Thermal Metric Research Project- Building Science Corporation
- Environmental Impact- On a 2,115 sq ft house a net and blow system saves an estimated 2,400 glass bottles from landfill
- 1 kilowatt of energy saved is equivalent to 2 gallons of water saved

2020 Zero Net Energy Coming Soon

What's Coming up for California & Other States ?



Another initiative, zero net energy building, goes far beyond energy code requirements with the concept that a building's energy footprint be either nonexistent or positive—all energy is used efficiently and on-site renewable energy generation offsets energy consumption. In the 2013 legislative session, three states considered legislation on zero net energy buildings. A pending California bill, [CAA 627](#), would require state agencies to consider net zero energy buildings when evaluating construction of new buildings. California's [Title 24](#) already requires [new residential construction to be zero net energy by 2020 while new commercial buildings must reach this target by 2030](#).

"A state agency, department, or commission, if it is evaluating the construction of a new building or facility, or the transfer or renewal of a lease for a building or facility, shall consider as a top priority in making that decision whether a net-zero energy consumption building or facility, also known as an energy-independent building or facility, can be constructed or occupied if that construction or occupancy can be accomplished at or at about the same market rate as a traditional building or facility, and the building or facility meets all of the location, size, and logistical requirements set forth in the agency's, department's, or commission's site selection process."

CALIFORNIA LEGISLATURE—2013-14 REGULAR SESSION, ASSEMBLY BILL, No. 627, INTRODUCED BY ASSEMBLY MEMBER GORALL, FEBRUARY 20, 2013

Title 24 CEC 2013 Section 110.7 Mandatory Requirements Infiltration

ALL OCCUPANCIES—MANDATORY REQUIREMENTS

SECTION 110.7 MANDATORY REQUIREMENTS TO LIMIT AIR LEAKAGE

All joints, penetrations and other openings in the building envelope that are potential sources of air leakage shall be caulked, gasketed, weather-stripped or otherwise sealed to limit infiltration and exfiltration.

SECTION 110.8 MANDATORY REQUIREMENTS FOR INSULATION, ROOFING PRODUCTS AND RADIANT BARRIERS

(a) **Insulation certification by manufacturers.** Any insulation shall be certified by Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation that the insulation conductive thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12 – 13, Article 3, "Standards for Insulating Material."

(b) **Installation of urea formaldehyde foam insulation.** Urea formaldehyde foam insulation may be applied or installed only if:

1. It is installed in exterior side walls; and
2. A 4-mil-thick plastic polyethylene vapor retarder or equivalent plastic sheathing vapor retarder is installed between the urea formaldehyde foam insulation and the interior space in all applications.

(c) **Flamespread rating of insulation.** All insulating material shall be installed in compliance with the flamespread rating and smoke density requirements of the CBC.

(d) **Installation of insulation in existing buildings.** Insulation installed in an existing attic, or on an existing duct or water heater, shall comply with the applicable requirements of subsections 1, 2 and 3 below. If a contractor installs the insulation, the contractor shall certify to the customer, in writing, that the insulation meets the applicable requirements of subsections 1, 2 and 3 below.

1. **Attics.** If insulation is installed in the existing attic of a low-rise residential building, the *R*-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall meet the requirements of Section 150.0(a).

Exception to Section 110.8(d)1: Where the accessible space in the attic is not large enough to accommodate the required *R*-value, the entire accessible space shall be filled with insulation, provided such installation does not violate Section 1203.2 of Title 24, Part 2.

2. **Water heaters.** If external insulation is installed on an existing unfired water storage tank or on an existing back-up tank for a solar water-heating system, it shall have an *R*-value of at least *R*-12, or the heat loss of the tank surface based on an 80°F water-air temperature difference shall be less than 6.5 Btu per hour per square foot.
3. **Ducts.** If insulation is installed on an existing space-conditioning duct, it shall comply with Section 605.0 of the CMC.

(e) **Insulation placement on roof/ceilings.** Insulation installed to limit heat loss and gain through the top of conditioned spaces shall comply with the following:

1. Insulation shall be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in Section 110.7, including but not limited to, placing insulation either above or below the roof deck or on top of a drywall ceiling; and
2. When insulation is installed at the roof in nonresidential buildings, fixed vents or openings to the outdoors or to unconditioned spaces shall not be installed, and the space between the ceiling and the roof is either directly or indirectly conditioned space and shall not be considered an attic for the purposes of complying with CBC attic ventilation requirements; and
3. Insulation shall not be placed on top of a suspended ceiling with removable ceiling panels to meet the roof/ceiling requirement of Sections 120.7, 140.3 and 141.0; and

Exception to Section 110.8(e)3: When there are conditioned spaces with a combined floor area no greater than 2,000 square feet in an otherwise unconditioned building, and when the average height of the space between the ceiling and the roof over these spaces is greater than 12 feet, insulation placed in direct contact with a suspended ceiling with removable ceiling panels shall be an acceptable method of reducing heat loss from a conditioned space and shall be accounted for in heat loss calculations.

4. Insulation shall be installed below the roofing membrane or layer used to seal the roof from water penetration unless the insulation has a maximum water absorption of 0.3 percent by volume when tested according to ASTM Standard C 272.

Note: Vents that do not penetrate the roof deck, that are designed for wind resistance for roof membranes, are not within the scope of Section 110.8(e)2.

(f) **Insulation for demising walls in nonresidential buildings.** The opaque portions of framed demising walls in nonresidential buildings shall be insulated with an installed *R*-value of no less than *R*-13 between framing members.

(g) **Insulation requirements for heated slab floors.** Heated slab floors shall be insulated according to the requirements in Table 110.8-A.

1. Insulation materials in ground contact must:
 - A. Comply with the certification requirements of Section 110.8(a); and
 - B. Have a water absorption rate for the insulation material alone without facings that is no greater than 0.3 percent when tested in accordance with Test Method A - 24 Hour-Immersion of ASTM C 272.
 - C. Water vapor permeance no greater than 2.0 perm/inch when tested in accordance with ASTM E96.

The Downside of Air Infiltration

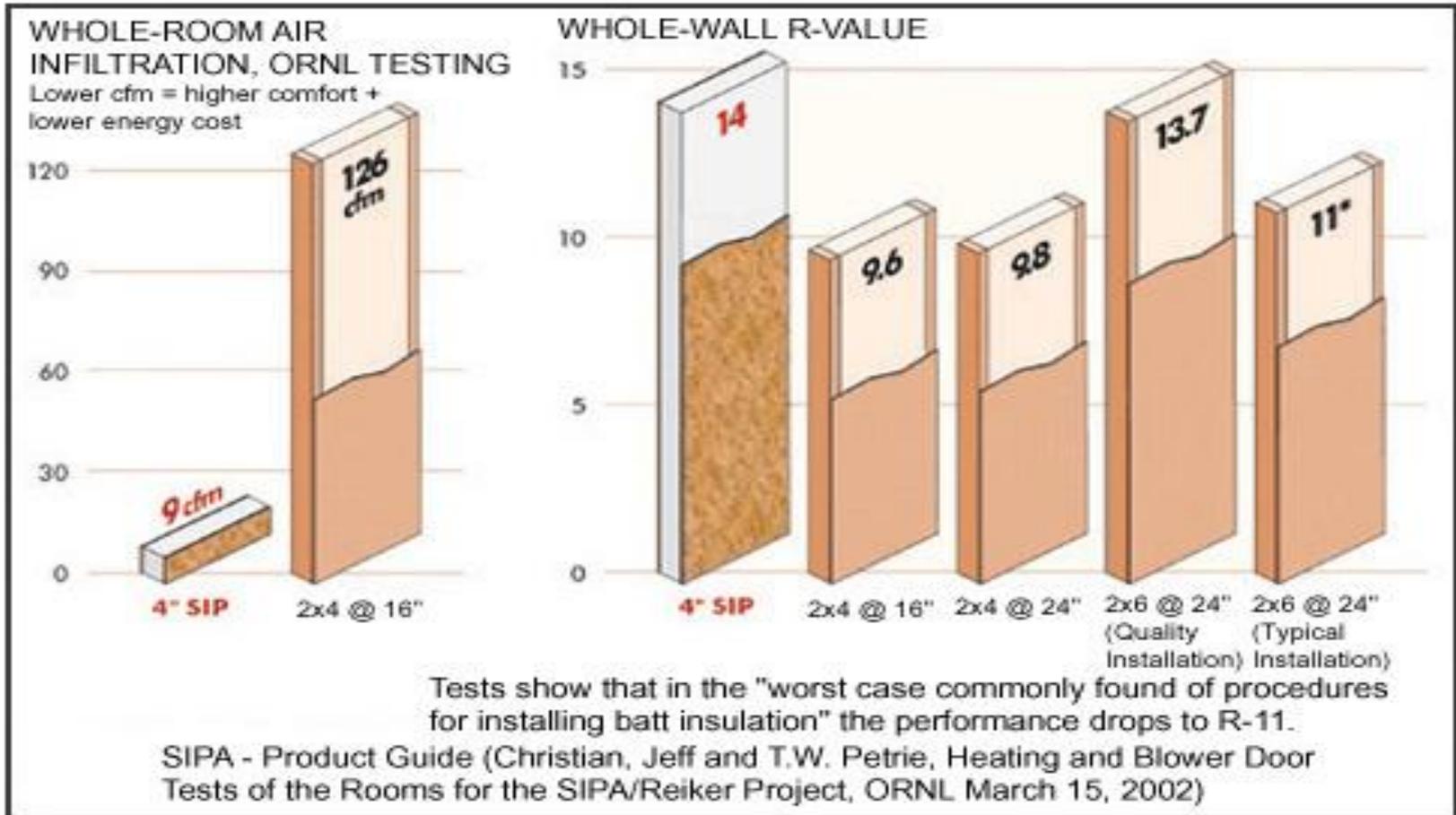
SO, WHY ARE AIR LEAKS CRITICAL?



- WASTE ENERGY • ROT HOUSES • POOR INDOOR AIR QUALITY •

with **ECOSE** 

The Problem- No Air Sealing



A 30" diameter hole is 706 square inches in area, or a window approximately 26.5 x 26.75 SQ. IN. open 24/7

THE AVERAGE HOME HAS A 30" HOLE.

STOP HEAT BLEED. SAVE MONEY. STOP LOSING.



Common Air Sealing Materials Pro's and Cons

Caulk

Strength

- Inexpensive
- Quick
- Little to no skilled labor required
- Other trades can be present
- No PPE required
- Easy cleanup



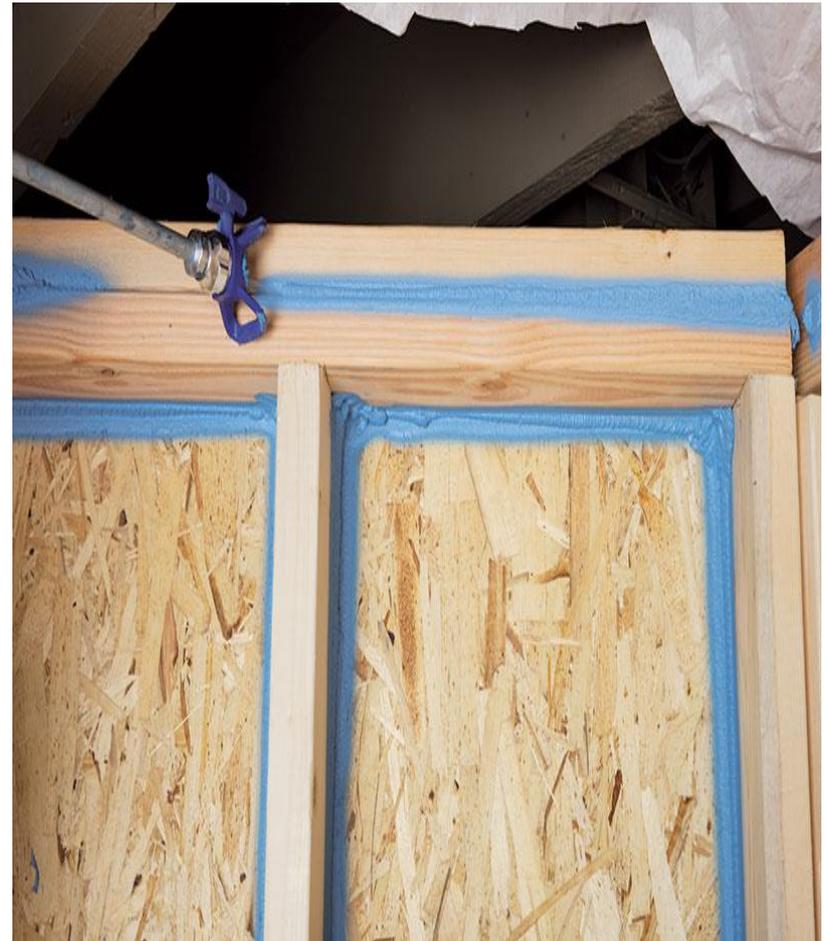
Weakness

- Does not adhere well in cold or wet conditions
- Is only surface applied
- Only lasts a few years (or as little as 24 hrs.)
- Requires ladders, scaffold or stilts in higher wall assemblies
- Has limited elasticity
- Is most often applied incorrectly

EcoSeal-Water-Based Elastomeric Sealant for Air Infiltration

- A More Eco-Friendly Alternative to Air Sealing

ECOSEAL[®]



Strength

- One part, water based elastomeric
- Applicable in any climate
- Adheres to most sub-straights
- Pressure applied 1800-2400 psi
- Greenguard™ & LBC Declare approved
- Other trades can work on premises
- 10 db reduction verses unsealed walls
- No PPE needed to use the product
- No VOC's
- Similar or equal results to a foam at a fraction of the cost
- Extremely long shelf life

Weakness

- Requires airless sprayer
- Is not recommended for exterior use



EcoSeal an acrylic air-sealing system **KNAUF INSULATION** *it's time to save energy*

- EcoSeal[®] is an acrylic product that is applied using high-pressure paint-spraying equipment.
- Bright-blue acrylic elastomeric material that is the consistency of very thick paint.
- Equipment and EcoSeal[®] can stay in one place in the house while the work proceeds.
- EcoSeal[®] doesn't expand as it is installed (as do foam sealants), and it takes up to day to fully cure. The cure time depends significantly on the environmental conditions—temperature, humidity, etc.
- The material can span up to about a 3/8-inch gap and it remains flexible
- If EcoSeal[®] gets on surfaces where it doesn't belong, it easily washes off with water.

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- A photograph showing a wooden floor joist system. The joists are made of light-colored wood and are spaced evenly. Blue foam insulation is applied to the joints between the joists, filling the gaps. The floor is covered with a layer of oriented strand board (OSB).
- Water based
 - Single component
 - Injected into construction joints
 - Home Owner & Trade friendly
 - Expands and Contracts with home
 - Same or next day insulation
 - Easy clean up
 - Guaranteed for LIFE!



Homes with EcoSeal leave less pathways for pests.



EcoSeal has very low VOCs, allowing other trades to work while it is being installed.



Class A rated with a smoke/fire rating of 0/0, EcoSeal is safe to use anywhere in the home

Equipment, Tools, Accessories, Clean Up



■ Ecoséal+ Benefits

- New Version Coming in 2015
- New Gasket Seal Advantage

Will create a solid seal for drywall installation

- Lighter weight pails for trade
- High Density sealant that can still be sprayed in a Graco 795 air sprayer
- Same Benefits of Ecoséal 1



