PROLOFT™

A new approach to constructing an R22 wall

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Introduction

The construction of a house wall with an effective thermal resistance of R22 has become a significant challenge for many builders. The common approach employs wider framing spacing (nominal 24" o/c) with the highest insulation batt available (R24). However this approach still falls short of the effective R22 value in that it requires either exterior insulation to address the shortfall or the use of medium density spray foam inside the framing to achieve the R22 value. Both approaches come at a higher cost in both labour and the installed price of the spray foam material. Proloft™ provides another solution that is cost effective and easier to install.

The R22 Wall

A typical constructed R22 building wall using framing 16" on centre with fiberglass batts is as outlined below:

Assembly Element	RSI Value (R value)
Exterior air film	0.03
Cladding (3/4" Stucco)	0.02
¾" Ventilated Air cavity	0.18
1 ½" Type 2 Exterior Insulation	1.06
7/16" OSB Sheathing	0.11
2x6 stud framing w/ R19 batt	2.36
½" drywall	0.08
Interior Air Film	0.12
Total Assembly R Value	3.96(22.48)

Increasing the batt insulation to R24 or changing insulation to medium density foam does not eliminate the need for exterior insulation. Additionally, as exterior insulation must be present, the thickness of the exterior insulation cannot be less than 20% of the total insulation of the assembly based upon the dew point of the sheathing face in the assembly. This limits the minimum exterior insulation to 1"thickness for Type 2 insulation before compromising the wall. For colder environments, the minimum thickness is greater.

As an alternative to adding more insulation to the exterior of the wall, adding Proloft™ to the framing members can provide a similar result. One layer of Proloft™ placed between the framing and the sheathing will raise the effective thermal resistance of the wood framing members. For a 2x6 wall stud, this raises the RSI value for the stud members with Proloft™ from 1.34 to 3.30 resulting in an increase in the complete wall assembly as can be seen in the table below.

Assembly Element	RSI Value (R value)
Exterior air film	0.03
Cladding (3/4" Stucco)	0.02

¾" Ventilated Air cavity	0.18
no Exterior Insulation	0.00
7/16" OSB Sheathing	0.11
2x6 stud 16" o/c framing w R19 batts and one layer of Proloft	3.58
½" drywall	0.08
Interior Air Film	0.12
Total Assembly R Value	4.12(23.39)

However 100% framing coverage with Proloft™ is not readily achievable without significant effort and may not be as cost competitive as compared to exterior insulation. The question then becomes as what level of coverage of Proloft™ is required to achieve an effective R22 wall assembly. The framing component of the wall assembly can be considered a combination of framing with Proloft™ and the remaining framing with an additional air cavity. The insulation value of the batt insulation must also be taken into account. The following table shows the required coverage of framing components with Proloft™ and the remaining framing components that have an air cavity.

	Installed batt Insulation		
Stud Spacing	R19/20	R22	R24
12"	88%	69%	62%
16"	88	67	56
19"	88	65	53
24"	88	63	49

What does this mean in the context of the framing of the wall assembly? Take the example of a Clear Wall assembly and the framing factor for that assembly. Consider placing Proloft™ on the vertical studs, the bottom plate and one of the top plates. The framing factor for a Clear Wall with one top plate and the bottom plate coverage is shown in the following table:

	BCBC 2012 Framing Factor Table A-9.36.2.4.(1)A	Clear Wall Assembly Framing Factor with single covered top and bottom plate	
Stud Spacing		8' wall	9' wall
12"	24.5%	15.2%	14.9%
16"	23	12.2	11.9
19"	21.5	10.7	10.4
24"	20	9.2	8.9

Now consider the case of a 9' wall that is 25' in length.

Total wall area = 9' x 25'

= 225 sq. ft.

For a wall with 16” frame spacing and using R24 batt insulation, the percentage of framing members that require Proloft™ for the wall assembly to be an R22 wall is 56% of the framing. This equates to:

=56% x 23% x 225

= 29 sq ft of Proloft™ coverage

Following along the above, the Clear Wall assembly has only 225 x 11.9% =26.75 sq ft of framing. The framing factor of the Clear Wall when compared to a BCBC specified wall assembly is:

= 11.9%/23%

= 51.7% of the total framing coverage

The additional framing requiring Proloft™ after the Clear wall assembly has been covered is only

=56% – 51.7%

= 4.3 % of the remaining framing

Or an additional 2.25 sq. ft.

In most 25’ walls, there will be at least two windows with a rough opening of 30” each. If the lintels and bottom of the window rough opening are also covered by Proloft™, the following lintel and bottom sill coverage is realized:

Window Lintel plus bottom sill

= 5.5” x 28” + 1.5” x 28”

= 1.36 sq ft

For the two windows, by covering the window headers and bottom sill, the additional coverage is 2.72 sq ft which exceeds what is required after the Clear Wall framing has been covered.

The total area of framing coverage by Proloft™ is roughly 1/8 of the total area when compared to exterior insulation that is required.

Conclusion

Building a wall assembly using Proloft™ as compared to exterior wall insulation is a viable alternative that requires consideration.