



**BSR/ASHRAE/IES Addendum ca
to ANSI/ASHRAE/IES Standard 90.1-2016**

Public Review Draft

Proposed Addendum ca to Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings

**First Public Review (February 2019)
(Draft Shows Proposed Changes to Current Standard)**

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FOREWORD

This proposed addendum adds U-factors to Table A3.2.3 for use of continuous insulation on metal building walls with double layer cavity insulation. The calculations follow the same basis of calculation used in other parts of the table based on calculation procedures in A9.4.6.

This proposal does not affect cost-effectiveness because it is adding options to the table.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~striketrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum ca to 90.1-2016

Modify the standard as follows (IP and SI Units)

Table A3.2.3 Assembly U-Factors for Metal Building Walls

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Wall Assembly	Overall U-Factor for Assembly of Base Wall Plus Continuous Insulation (Uninterrupted by Framing)								
			R-6.5	R-9.8	R-13	R-15.8	R-19	R-22.1	R-25	R-32	R-38
Continuous insulation only	R-0	1.180	0.136	0.094	0.072	0.060	0.050	0.044	0.039	0.030	0.026
Single compressed layer	R-10	0.186	0.084	0.066	0.054	0.047	0.041	0.036	0.033	0.027	0.023
	R-11	0.185	0.084	0.066	0.054	0.047	0.041	0.036	0.033	0.027	0.023
	R-13	0.162	0.079	0.063	0.052	0.046	0.040	0.035	0.032	0.026	0.023
	R-16	0.155	0.077	0.062	0.051	0.045	0.039	0.035	0.032	0.026	0.022
	R-19	0.147	0.075	0.060	0.050	0.044	0.039	0.035	0.031	0.026	0.022
Single layer in cavity	R-25 ^a	0.059	0.044	0.039	0.035	0.032	0.029	0.027	0.025	0.021	0.019
	R-30 ^b	0.052	0.042	0.037	0.033	0.031	0.028	0.026	0.024	0.021	0.019
Double layer	R-25 + R-10	0.047	<u>0.038</u>	<u>0.034</u>	<u>0.031</u>	<u>0.028</u>	<u>0.026</u>	<u>0.024</u>	<u>0.023</u>	<u>0.020</u>	<u>0.018</u>
	R-25 + R-16	0.042	<u>0.036</u>	<u>0.032</u>	<u>0.029</u>	<u>0.027</u>	<u>0.025</u>	<u>0.023</u>	<u>0.022</u>	<u>0.019</u>	<u>0.018</u>
	R-25 + R-10 ^c	0.039	<u>0.032</u>	<u>0.029</u>	<u>0.027</u>	<u>0.025</u>	<u>0.023</u>	<u>0.022</u>	<u>0.021</u>	<u>0.018</u>	<u>0.017</u>
	R-30 + R-16	0.039	<u>0.036</u>	<u>0.032</u>	<u>0.029</u>	<u>0.027</u>	<u>0.025</u>	<u>0.023</u>	<u>0.022</u>	<u>0.019</u>	<u>0.017</u>

(Multiple R-values are listed in order from inside to outside.)

a. A minimum R-0.375 thermal spacer block or thermal break strip is required when installed without *continuous insulation*.

b. A minimum R-0.75 thermal spacer block or thermal break strip is required when installed without *continuous insulation*.

c. A minimum R-3 thermal spacer block is required.

SI VERSION:

Table A3.2.3 Assembly U-Factors for Metal Building Walls

Insulation System	Rated R-Value of Insulation	Overall U-Factor for Entire Base Wall Assembly	Overall U-Factor for Assembly of Base Wall Plus Continuous Insulation (Uninterrupted by Framing)								
			R-1.1	R-1.7	R-2.3	R-2.8	R-3.3	R-3.9	R-4.4	R-5.6	R-6.7
Continuous insulation only	R-0	6.70	0.773	0.53	0.41	0.34	0.29	0.25	0.22	0.17	0.15
Single compressed layer	R-1.8	1.06	0.48	0.37	0.31	0.27	0.23	0.21	0.19	0.15	0.13
	R-1.9	1.05	0.48	0.37	0.31	0.27	0.23	0.21	0.19	0.15	0.13
	R-2.3	0.920	0.45	0.36	0.30	0.26	0.23	0.20	0.18	0.15	0.13
	R-2.8	0.880	0.44	0.35	0.29	0.26	0.22	0.20	0.18	0.15	0.13
	R-3.3	0.835	0.43	0.34	0.28	0.25	0.22	0.20	0.18	0.15	0.13
Single layer in cavity	R-4.4 ^a	0.335	0.25	0.22	0.20	0.18	0.16	0.15	0.14	0.12	0.11
	R-5.5 ^b	0.295	0.24	0.21	0.19	0.18	0.16	0.15	0.14	0.12	0.11
Double layer	R-4.4 + R-1.8	0.267	<u>0.216</u>	<u>0.193</u>	<u>0.176</u>	<u>0.159</u>	<u>0.145</u>	<u>0.136</u>	<u>0.131</u>	<u>0.114</u>	<u>0.102</u>
	R-4.4 + R-2.8	0.238	<u>0.204</u>	<u>0.182</u>	<u>0.165</u>	<u>0.153</u>	<u>0.142</u>	<u>0.131</u>	<u>0.125</u>	<u>0.108</u>	<u>0.102</u>
	R-4.4 + R-1.8 ^c	0.221	<u>0.182</u>	<u>0.165</u>	<u>0.153</u>	<u>0.142</u>	<u>0.131</u>	<u>0.125</u>	<u>0.119</u>	<u>0.102</u>	<u>0.097</u>
	R-5.3 + R-2.8	0.221	<u>0.204</u>	<u>0.182</u>	<u>0.165</u>	<u>0.153</u>	<u>0.142</u>	<u>0.131</u>	<u>0.125</u>	<u>0.108</u>	<u>0.097</u>

(Multiple R-values are listed in order from inside to outside.)

a. A minimum R-0.07 thermal spacer block or thermal break strip is required when installed without *continuous insulation*.

b. A minimum R-0.13 thermal spacer block or thermal break strip is required when installed without *continuous insulation*.

c. A minimum R-0.5 thermal spacer block is required.