

HRAI RHLG MANUAL (2014 ED) ADDENDUM

CSA F280-12: JUNE 2018 UPDATE

Introduction

The 2012 edition of CSA F280 standard (CSA F280-12) was first published in March 2012, superseding the previous edition published in 1990.

Many changes in the 2012 edition of the standard were introduced to reflect advancements in building science and the energy efficiency of new buildings and ensure accurate calculation of residential space heating and cooling loads.

Since its first publication in March 2012, several revisions have been made to CSA F280-12 standard.

Date	Revision
March 2014	Update No.1 was made
April 2016	Corrections and fixes were made to CSA F280-12 spreadsheet calculators
June 2018	Update No. 2 was made

While HRAI Residential Heat Loss & Heat Gain Manual, Fifth Edition (2014 ed.) incorporates the March 2014 updates made to CSA F280-12 standard, the manual does not address the June 2018 updates made to the standard.

This supplemental guide to HRAI Residential Heat Loss & Heat Gain Manual, Fifth Edition is intended to provide a summary of June 2018 updates made to CSA F280-12, and HRAI's interpretation of the updates.

HOW TO USE THIS GUIDE

Code references can be found in blue boxes with solid lines

Yellow boxes with dotted borders direct readers to places where HRAI's existing Residential Heat Loss & Heat Gain (RHLG) Manual (5th ed.) and worksheets need to be revised

This guide is a supplement to, and is intended to be read/interpreted along with the HRAI Residential Heat Loss & Heat Gain Manual, Fifth Edition (2014 ed.).

This is an HRAI's interpretation of June 2018 updates made to CSA F280-12 (Determining the Required Capacity of Residential Space Heating and Cooling Appliances), the reader should refer to the standard itself for precise definitions of the requirements. (E. & O.E.)

In addition, HRAI training may include additions, deductions and alterations to the CSA F280-12 methodologies.

Readers should carefully read through this guide and make revisions to HRAI's existing Residential Heat Loss & Heat Gain Manual (5th ed.) and its worksheets by hand, as **highlighted in red**.

Design Environmental Conditions

Assumed Facing Direction of The Building If Actual Facing Direction is Unknown

With June 2018 update, CSA F280-12 now tells designers to assume the building orientation having the wall with the most glazing facing **southwest**, when the actual facing direction for the building is unknown.

To reflect this revision, readers need to make the below change to HRAI's existing Residential Heat Loss & Heat Gain Manual (5th ed.)

CSA F280-12 Annex D, Note (2)

HRAI's RHLG Manual Revision:
Page 124, Note B

Note B: If you are designing a cooling system for a builder's house model without knowing which direction it will be oriented, you should assume the orientation that results in the wall with the most glazing facing **south southwest**.

Cooling Systems

Sensible Heat Gain Due to Ventilation

In the updated CSA F280-12 standard, if a heat recovery ventilator or energy recovery ventilator is used to provide continuous balanced air flow, its Adjusted Total Recovery Efficiency (ATRE) for cooling mode, is now used to allow for a reduced sensible ventilation heat gain load.

CSA F280-12 Clause 6.2.7

Due to this update, HRAI's ventilation heat gain formula will now include the newly added term: **(1 - ATRE)**.

HRAI Worksheet Revision:

HRAI Residential Heat Loss and Heat Gain Calculations

Formula Sheet (For Air Leakage / Ventilation Calculation)

Note about ATRE:

Adjusted Total Recovery Efficiency (ATRE) can be looked up from Home Ventilating Institute's (HVI) certified-product directory (https://www.hvi.org/proddirectory/CPD_Reports/section_3/index.cfm) under HRV/ERV's cooling mode performance data.

If a ventilation system does not use HRV/ERV (e.g. Exhaust-only system) or no ATRE is being reported, then the designer should assume value of zero for ATRE.

VENTILATION HEAT GAIN	
$HG_{bvent} = C \times PVC \times HG\Delta T \times (1 - ATRE)$	C (M) = 1.2 C (I) = 1.08
$= \underline{\quad} \times \underline{\quad} \times \underline{\quad} \times \underline{\quad} = \boxed{\quad}$	
Case #1: Exhaust Only System (Section 12a)	
Multiplier = $\frac{HG_{bvent}}{\text{Building Conductive Heat Gain}}$	
Multiplier = $\underline{\quad} = \boxed{\quad}$	
$HG_{rvent} = \text{Multiplier} \times \text{Room Conductive Heat Gain}$	
Case #2: Direct Ducted System (Section 12b)	
$\text{Multiplier} = C \times HG\Delta T \times (1 - ATRE)$	C (M) = 1.2 C (I) = 1.08
$\text{Multiplier} = \underline{\quad} \times \underline{\quad} \times \underline{\quad} = \boxed{\quad}$	
$Q_{vr} = \text{Room Ventilation Rate}$ $HG_{rvent} = \text{Multiplier} \times Q_{vr}$	
Case #3: Central Forced Air System (Section 22)	
$HG_{bvent} \times 1.3 = \boxed{\quad} \times 1.3 = \boxed{\quad}$	
(enter in Section 22)	

Heat Gain Through Transparent and Translucent Building Assemblies

Updated Solar Heat Gain Coefficient (SHGC) Values on Tables 6F & 6G

CSA F280-12 Tables 6F & 6G

Readers should keep in mind that looking up manufacturer's windows specification sheet is still the most accurate and preferred method in obtaining SHGC values.

Default solar heat gain coefficient (SHGC) values on Tables 6F & 6G on CSA F280-12 were updated:

- "Low-E" coated double-glazed windows listed on CSA F280-12 Table 6F now have the default SHGC value of 0.47
- "Low-E" coated triple-glazed windows listed on CSA F280-12 Table 6F now have the default SHGC value of 0.40

As a result, SHGC values listed in existing Tables 3 & 4 in Appendix A of HRAI Residential Heat Loss & Heat Gain Manual, Fifth Edition (2014 ed.), also need to be updated as well. This addendum document includes replacement pages for Tables 3 & 4 in Appendix A of HRAI Residential Heat Loss & Heat Gain Manual, Fifth Edition (2014 ed.)

Please note that despite of this update in default SHGC values for "Low-E" coated double and triple-glazed windows, designers are still recommended to use SHGC values looked up directly from manufacturer's specification sheet for most accurate values.

REPLACEMENT PAGE: Appendix A (Imperial) Page A-7

**Table 3: R value and SHGC of double glazed windows
(CSA:F280-12 Jun 2018 Update)**

Frame Material	Spacer	Coatings	Glazing spacing									
			1/4"				11/32"		1/2"			
			Air		Argon		Krypton		Air		Argon	
			R value	SHGC	R value	SHGC	R value	SHGC	R value	SHGC	R value	SHGC
Fixed - Aluminum	Metal	Clear	1.25	0.65	1.25	0.65	1.36	0.65	1.31	0.65	1.36	0.65
		Low-E	1.42	0.47	1.53	0.47	1.76	0.47	1.59	0.47	1.70	0.47
	Insulating	Clear	1.25	0.65	1.31	0.65	1.42	0.65	1.36	0.65	1.42	0.65
		Low-E	1.48	0.47	1.65	0.47	1.87	0.47	1.70	0.47	1.82	0.47
Fixed - Wood/Vinyl	Metal	Clear	1.70	0.60	1.82	0.60	1.99	0.60	1.87	0.60	1.99	0.60
		Low-E	2.04	0.47	2.33	0.47	2.90	0.47	2.56	0.47	2.56	0.47
	Insulating	Clear	1.82	0.59	1.99	0.59	2.16	0.59	2.04	0.59	2.16	0.59
		Low-E	2.27	0.47	2.67	0.47	3.35	0.47	2.90	0.47	3.24	0.47
Operable - Aluminum	Metal	Clear	1.08	0.63	1.08	0.63	1.14	0.63	1.14	0.63	1.14	0.63
		Low-E	1.19	0.47	1.25	0.47	1.87	0.47	1.31	0.47	1.36	0.47
	Insulating	Clear	1.08	0.63	1.14	0.63	1.19	0.63	1.14	0.63	1.19	0.63
		Low-E	1.19	0.47	1.65	0.47	1.48	0.47	1.36	0.47	1.48	0.47
Operable - Wood/Vinyl	Metal	Clear	2.10	0.49	1.82	0.49	1.99	0.49	1.87	0.49	1.93	0.49
		Low-E	2.33	0.47	2.21	0.47	2.61	0.47	2.38	0.47	2.56	0.47
	Insulating	Clear	2.33	0.49	1.99	0.49	2.16	0.49	2.04	0.49	2.10	0.49
		Low-E	2.61	0.47	2.50	0.47	2.95	0.47	2.67	0.47	2.90	0.47

Note:

- 1) Rough openings for windows shall be used in the calculations.
- 2) If space between adjacent panes is less than 6 mm, glazing shall be treated as one layer.
- 3) There are specific measurement tools available for determining the presence of low-e coatings on installed windows. There is no practical way to determine the presence of argon or other gas fillings. There might be identifying marks etched into the spacer material or at the edge of the glass. If the presence of coatings or fillings cannot be determined, designers may wish to choose conservative R values and SHGC

How to use this replacement page:
Use this page to replace page A-7 in Appendix A (Imperial) of HRAI's Residential Heat Loss & Gain Manual, Fifth Edition (2014 Ed.)

REPLACEMENT PAGE: Appendix A (Imperial) Page A-8:**Table 4: R value and SHGC of triple glazed windows with one coating
(CSA:F280-12 Jun 2018 Update)**

Frame Material	Spacer	Coatings	Glazing spacing									
			1/4"				11/32"		1/2"			
			Air		Argon		Krypton		Air		Argon	
			R value	SHGC	R value	SHGC	R value	SHGC	R value	SHGC	R value	SHGC
Fixed - Aluminum	Metal	Clear	1.48	0.58	1.53	0.58	1.65	0.58	1.59	0.58	1.65	0.58
		Low-E	1.59	0.40	1.70	0.40	1.93	0.40	1.82	0.40	1.93	0.40
	Insulating	Clear	1.53	0.58	1.59	0.58	1.76	0.58	1.70	0.58	1.76	0.58
		Low-E	1.70	0.40	1.82	0.40	2.10	0.40	1.93	0.40	2.04	0.40
Fixed - Wood/Vinyl	Metal	Clear	2.21	0.53	2.33	0.53	2.67	0.53	2.50	0.53	2.61	0.53
		Low-E	2.44	0.40	2.78	0.40	3.41	0.40	3.07	0.40	3.35	0.40
	Insulating	Clear	2.44	0.53	2.67	0.53	3.12	0.53	2.95	0.53	3.07	0.53
		Low-E	2.84	0.40	3.24	0.40	4.26	0.40	3.75	0.40	4.14	0.40
Operable - Aluminum	Metal	Clear	1.19	0.57	1.25	0.57	1.36	0.57	1.31	0.57	1.31	0.57
		Low-E	1.31	0.40	1.36	0.40	1.53	0.40	1.42	0.40	1.48	0.40
	Insulating	Clear	1.53	0.58	1.31	0.57	1.42	0.57	1.36	0.57	1.42	0.57
		Low-E	1.70	0.40	1.82	0.40	1.59	0.40	1.53	0.40	1.59	0.40
Operable - Wood/Vinyl	Metal	Clear	2.10	0.44	2.21	0.44	2.50	0.44	2.38	0.44	2.50	0.44
		Low-E	2.33	0.40	2.50	0.40	3.01	0.40	2.78	0.40	2.95	0.40
	Insulating	Clear	2.33	0.44	2.50	0.44	2.95	0.43	2.84	0.43	2.95	0.43
		Low-E	2.61	0.40	2.90	0.40	3.75	0.40	3.41	0.40	3.63	0.40

Note:

- 1) Rough openings for windows shall be used in the calculations.
- 2) If space between adjacent panes is less than 6 mm, glazing shall be treated as one layer.
- 3) There are specific measurement tools available for determining the presence of low-e coatings on installed windows. There is no practical way to determine the presence of argon or other gas fillings. There might be identifying marks etched into the spacer material or at the edge of the glass. If the presence of coatings or fillings cannot be determined, designers may wish to choose conservative R values and SHGC

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REPLACEMENT PAGE: Appendix A (Metric) Page A-7

**Table 3: R value and SHGC of double glazed windows
(CSA:F280-12 Jun 2018 Update)**

Frame Material	Spacer	Coatings	Glazing spacing									
			6 mm				9 mm		13 mm			
			Air		Argon		Krypton		Air		Argon	
			RSI value	SHGC	RSI value	SHGC	RSI value	SHGC	RSI value	SHGC	RSI value	SHGC
Fixed - Aluminum	Metal	Clear	0.22	0.65	0.22	0.65	0.24	0.65	0.23	0.65	0.24	0.65
		Low-E	0.25	0.47	0.27	0.47	0.31	0.47	0.28	0.47	0.30	0.47
	Insulating	Clear	0.22	0.65	0.23	0.65	0.25	0.65	0.24	0.65	0.25	0.65
		Low-E	0.26	0.47	0.29	0.47	0.33	0.47	0.30	0.47	0.32	0.47
Fixed - Wood/Vinyl	Metal	Clear	0.30	0.60	0.32	0.60	0.35	0.60	0.33	0.60	0.35	0.60
		Low-E	0.36	0.47	0.41	0.47	0.51	0.47	0.45	0.47	0.45	0.47
	Insulating	Clear	0.32	0.59	0.35	0.59	0.38	0.59	0.36	0.59	0.38	0.59
		Low-E	0.40	0.47	0.47	0.47	0.59	0.47	0.51	0.47	0.57	0.47
Operable - Aluminum	Metal	Clear	0.19	0.63	0.19	0.63	0.20	0.63	0.20	0.63	0.20	0.63
		Low-E	0.21	0.47	0.22	0.47	0.33	0.47	0.23	0.47	0.24	0.47
	Insulating	Clear	0.19	0.63	0.20	0.63	0.21	0.63	0.20	0.63	0.21	0.63
		Low-E	0.21	0.47	0.29	0.47	0.26	0.47	0.24	0.47	0.26	0.47
Operable - Wood/Vinyl	Metal	Clear	0.37	0.49	0.32	0.49	0.35	0.49	0.33	0.49	0.34	0.49
		Low-E	0.41	0.47	0.39	0.47	0.46	0.47	0.42	0.47	0.45	0.47
	Insulating	Clear	0.41	0.49	0.35	0.49	0.38	0.49	0.36	0.49	0.37	0.49
		Low-E	0.46	0.47	0.44	0.47	0.52	0.47	0.47	0.47	0.51	0.47

NOTE:

- 1) Rough openings for windows shall be used in the calculations.
- 2) If space between adjacent panes is less than 6 mm, glazing shall be treated as one layer.
- 3) There are specific measurement tools available for determining the presence of low-e coatings on installed windows. There is no practical way to determine the presence of argon or other gas fillings. There might be identifying marks etched into the spacer material or at the edge of the glass. If the presence of coatings or fillings cannot be determined, designers may wish to choose conservative RSI values and SHGC.

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(CSA:F280-12 Jun 2018 Update)**

Frame Material	Spacer	Coatings	Glazing spacing									
			6 mm				9 mm		13 mm			
			Air		Argon		Krypton		Air		Argon	
			RSI value	SHGC	RSI value	SHGC	RSI value	SHGC	RSI value	SHGC	RSI value	SHGC
Fixed - Aluminum	Metal	Clear	0.26	0.58	0.27	0.58	0.29	0.58	0.28	0.58	0.29	0.58
		Low-E	0.28	0.40	0.30	0.40	0.34	0.40	0.32	0.40	0.34	0.40
	Insulating	Clear	0.27	0.58	0.28	0.58	0.31	0.58	0.30	0.58	0.31	0.58
		Low-E	0.30	0.40	0.32	0.40	0.37	0.40	0.34	0.40	0.36	0.40
Fixed - Wood/Vinyl	Metal	Clear	0.39	0.53	0.41	0.53	0.47	0.53	0.44	0.53	0.46	0.53
		Low-E	0.43	0.40	0.49	0.40	0.60	0.40	0.54	0.40	0.59	0.40
	Insulating	Clear	0.43	0.53	0.47	0.53	0.55	0.53	0.52	0.53	0.54	0.53
		Low-E	0.50	0.40	0.57	0.40	0.75	0.40	0.66	0.40	0.73	0.40
Operable - Aluminum	Metal	Clear	0.21	0.57	0.22	0.57	0.24	0.57	0.23	0.57	0.23	0.57
		Low-E	0.23	0.40	0.24	0.40	0.27	0.40	0.25	0.40	0.26	0.40
	Insulating	Clear	0.27	0.58	0.23	0.57	0.25	0.57	0.24	0.57	0.25	0.57
		Low-E	0.30	0.40	0.32	0.40	0.28	0.40	0.27	0.40	0.28	0.40
Operable - Wood/Vinyl	Metal	Clear	0.37	0.44	0.39	0.44	0.44	0.44	0.42	0.44	0.44	0.44
		Low-E	0.41	0.40	0.44	0.40	0.53	0.40	0.49	0.40	0.52	0.40
	Insulating	Clear	0.41	0.44	0.44	0.44	0.52	0.43	0.50	0.43	0.52	0.43
		Low-E	0.46	0.40	0.51	0.40	0.66	0.40	0.60	0.40	0.64	0.40

NOTE:

- 1) Rough openings for windows shall be used in the calculations.
- 2) If space between adjacent panes is less than 6 mm, glazing shall be treated as one layer.
- 3) There are specific measurement tools available for determining the presence of low-e coatings on installed windows. There is no practical way to determine the presence of argon or other gas fillings. There might be identifying marks etched into the spacer material or at the edge of the glass. If the presence of coatings or fillings cannot be determined, designers may wish to choose conservative RSI values and SHGC.

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