

Presented to: BOABC Webinar

# CSA F280 HVAC Requirements & Single Zone Cooling for Part 9 Buildings

Presented by: Todd Backus, P.Eng. March 18<sup>th</sup>, 2025



### AGENDA

- 1. Introduction
- 2. CSA F280-12 Standard
- 3. Certified Calculators
- 4. BCBC & NBC Requirements
- 5. HLHG Inputs & Reports
  - Common Errors & Omissions
- 6. HLHG Calculation Example
- 7. 26°C Refuge Room Example
  - When Cooling is Required
- 8. Q&A



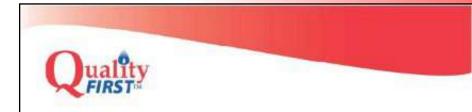
F280-12

Determining the required capacity of residential space heating and cooling appliances



# **ABOUT TECA**

- Non-Profit Trade Association
- Our Mission:
  - $\circ~$  Further Education in the HVAC Industry
  - $\circ~$  Develop & Provide Training in the HVAC Industry
  - Practical Training for Trades People & Inspectors
  - Advocate for the HVAC Trades to Government
  - Advise Regulators & Building Officials on Best
     Practices



#### Heat Loss & Heat Gain

Incorporating the CSA F280-12 Calculation Methods

**Calculation Methods & Program User Manual** 



Includes Software & Training

First Edition, April 2018





### **ABOUT TECA**

TECA provides:

- Training for Heat Loss & Heat Gain calculations
- TECA's HLHG calculator is required for the course
- Collaboration with HPSC
  - Acceptable courses for Home Performance Contractor
     Network HVAC certification





Heat Loss & Heat Gain

Incorporating the CSA F280-12 Calculation Methods

**Calculation Methods & Program User Manual** 



Includes Software & Training

First Edition, April 2018





# **BCBC HVAC REQUIREMENTS**

### Major HVAC Sections in Part 9:

- 9.32. Ventilation
- 9.33. Heating & Air Conditioning
- 9.36. Energy Efficiency

Equipment efficiency:

• 9.37. GHG Emissions





# **EXTREME HEAT REPORT**

- Extreme heat wave (or heat dome)
- 619 deaths from extreme heat
  - June 25<sup>th</sup> July 1<sup>st</sup>, 2021
  - 98% of deaths occurred indoors
- High pressure area trapped heat for days & set record temperatures
  - Many locations hit 40°C (104°F)
  - Overnight temperatures stayed high

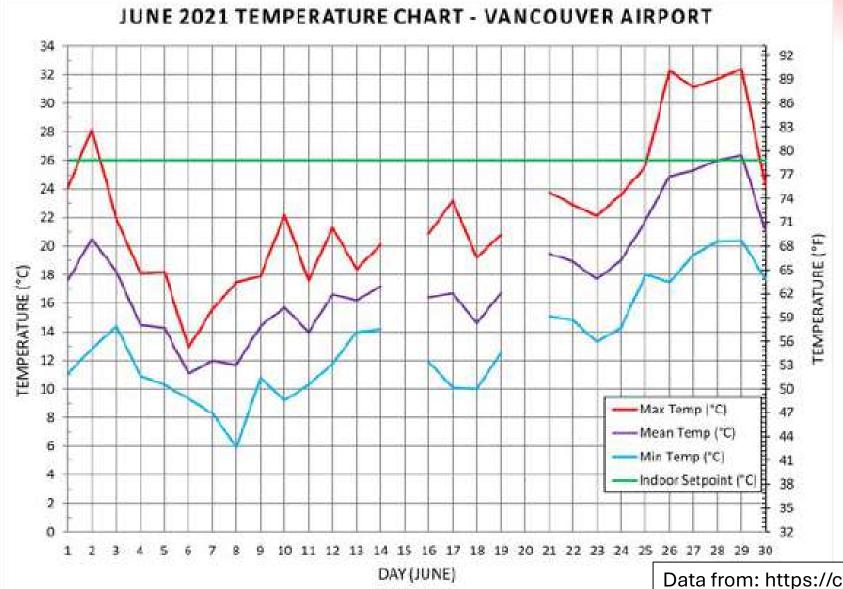
Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021

Report to the Chief Coroner of British Columbia Release Date: June 7, 2022



teca

thermal environmental comfort association



Data from: https://climate.weather.gc.ca/



# **CSA F280 COMPLIANCE**

- Critical for proper equipment selection
  - Proper calculations & documentation is the foundation of HVAC design

- Required for sizing distribution systems
  - Duct sizing, and/or
  - Hydronic piping
- Verification of code compliance
  - Reports must be reviewed by AHJ
  - Standard report format facilitates reviews

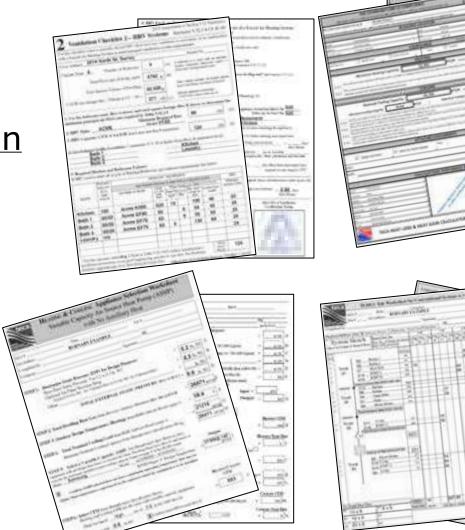




# **DESIGN & PLAN CHECKING**

### **Recommended Building Permit Documents:**

- Ventilation Checklist
- Heat Loss & Heat Gain Calculation
- Equipment Selection Worksheet
- Design Summary
- System Drawings & Schematics
- Required Permits





# CSA F280-12 (R2021)



Determining the required capacity of residential space heating and cooling appliances



# **CSA F280 STANDARD**

### Scope of CSA F280-12 (R2021):

- Calculation method for heat loss & heat gain
- Used for selecting equipment
- Applies to Part 9 Buildings
- Does not comment on distribution systems or installation practices
- Only outputs peak loads!



F280-12

Determining the required capacity of residential space heating and cooling appliances



## CSA F280 STANDARD

- For <u>entire dwelling</u> heating & cooling
- **NOT** designed to model a single room
  - Assumptions must be made to

model a single room

- TECA & HVAC DC:
  - Finalizing modeling guidelines •



The BC Building Code (BCBC) 2024 Introduced a maximum design temperature limit of 26°C for a minimum of a single living space in each dwalling unit. In April 2024, the Province of BC's Building's Safety and Standards Branch (8558) released information Bulletin No. 824-08 that provides information on the new provisions in the BCBC 2024 related to minimizing the risks to health and safety due to. overheating in dwelling units. Aithough the 0558 builetin provided general information on requirements, and strategies with mechanical cooling systems as well as some passive design measures, it did not provide the necessary depth on the technical considerations to meet the BCBC 2024 requirements.

To address these concerns, HVAC Designers of Canada (HVAC DC) and the Thermal Environmental Confort Association (TCCA) together with stakeholders from the home building sector have developed a Guideline on Single Zone Cooking in Dwelling Units.

We thank the following individuals and organizations for their valuable contribution to the development of this Guideline.

Todd Backus Data Bowser, Liam Butters, -Sean Capitick Byan Coleman Chris Devel, Sohn Harris Seamus Jones, Pete Koelpin, Fortis BC Wilma Leung. **BL** Hotning Matt MeMaster Wob Proper, Pauline Rupp. Robin Sandlands. Scott Williams.

Thermal Environmental Comfort Association HVAC Designers of Cariada. Ecology Consulting City of Langford **Ecolighten Energy Solutions Our Energy Consulting** Heating Refrigeration & Air Conditioning Institute Natural Resources Canada, SEEP City of Nanaimo **Ecoligitten Energy Solutions** Canadian Home Builders Association of 80 Avenir Software BC Building and Safety Standards Branch

This document was developed with financial support from Natural Resources Canada UEP, based on a CSA F280 3.2 Seed Document on single zone cooling.



### CSA F280-12 SCOPE

#### **1.3 - Scope**

This Standard applies to space heating and cooling appliances for use in housing and small buildings of residential occupancy to which <u>Part 9</u> of the National Building Code of Canada applies, <u>where the appliances are permanently installed</u> within the dwelling unit they serve.





### **CSA F280-12 REPORTING**

### 7.1 - Reporting

A table of inputs shall be prepared that lists all of the pertinent information and assumptions upon which the calculation is based, including but not limited to

- a) a <u>list of the input data</u> contained in the "Heat loss and gain calculation summary sheet" shown in Annex D; and
- b) the working fluid temperature for heating floor assemblies in contact with soil or exposed to the exterior.





### **CSA F280-12 REPORTING**

### 7.2 - Reporting

Where the <u>facing direction, air-tightness, or interior window shading</u> of the building is not known at the time of preparation of the calculation (i.e., in cases where the home is not yet built), <u>the table of</u> inputs shall clearly indicate that these values are assumed.





# **CSA F280 REPORTING**

### **CSA Standard F280-12 Report:**

- Standard report form is required to simplify the review process
  - Contains critical design information noted in CSA F280 Standard

 Single room cooling also has a standardized format

1			F280-12 COM	0.0000000			CSA1280-12 m Set Ver 24.10
	60 2015 10 28.5.1 (16 04)		C313/41121/#1	832,83833	POE NUMBER OF	10	PROJECT #
	is incomed that the area off unand by any other persoon	Teca			and an an all shad he was	10	1
end integrated for a	united by any other periods	antional and of the		GLOCATH		- 1	
			DURDIN				
Model	No. 2212/2000			4501			
Ooy & Province	132 Alloyia D. W famiologis, AC			- Let.			
29 a Province	Lansage Pe		CON	PLIANCE	20100	A 1 No. of the owner of	entropy of the same to same an
iametaisthe -	· · · · · · · · · · · · · · · · · · ·	- 2	Room by Room	- Linit:	🗹 mpetal	C Mok	
-		<u>n</u>	HE	ATING	10000100127	111	
×	14-2004-001466		_			100705-002	(10.20)
	Minimum H	eating Capacit	Y 1	0.168	BTUH dotart	usiding hear issues as a	w125
5.3.1 Tetal	tel hell output capacity of	all heating sustem) in	index) or a limiting stud	not be less than 3	00% of the total looking be	el loss er deferritions	d in Gene 5.2.7.
5.3.2 fees	maned heating arrively of	the beating systems i	had agree a room or upon	a plat ant be wa	than 200% of the space heat	COLL IN APPRICATE	tin Oaar 5.2.6. (# room by
2.2.4 -008.1	nderrithäl, see pape 2 for in-	dividual space heating	reparements:				
			CC	OLING			
	Nominal C	ooling Capacit	~ [	0,577	ATUH	al Cooling Capacity I	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
		-	_		A CONTRACTOR OF A CONTRACTOR A CONTR	THE PROPERTY.	
Mini	mum Cooling Capaci	N: 24.40	2 #TUH	-4	iudmum Coolibig Capa	sity: 38	L221 BTUM
	ecosid stress offices		10.5750 N (0.4910/n).	STIDE OF	6,000 W (1.7 save), the bala	the lowers system a	apacity may exceed the
			ATTACHED	DOCOME	ENTS		
	Design Summary	Rosers b	y Room Results	Other			
Orther)							
Noten							
In the second second	etoxe						
C.C.C.			CALCULATION	C DEDITOD	MED 89		
-						Andrew But	
10 Sec. 1	Andrew Bytter				1		er responsibility for the design
Company					13 -	ek described in this &	content & Last qualified in 8
And in case of the local division of the	565 Ruis Pace			100	6. F	englais seaguras	4
	Collowed, NC			R.	1 E	and a	
	28 851 (04 991 7878		1	R VS.08		ar for	
Tat.	NA 1911 (010		1	6 1	1	110	
	ener@ec.a		Caller Caller	9	100	n 1 4	27
-	AND A REPORT OF		1.				
	TECA HEAT LO This calculato		Sector and the sector of the s	R V5.08	-		FED F210 SOFTWARE



### **PREVIOUS CSA F280 REPORT**

PREAST # HIP-SP-01-ME.408 AAULITEET

						1952	0.6.8	CIER I	100.0	evane,	ATMAN
NEWT GAIN CONFORMAT BREAKDOWN, (FTUN)	1	Į	I	i1		Į	1	1	I	-	1
man whether	100		-	100	-	-	114	-		100	1000
street, we a lost shake	1.12			100		- 6	1.64			- 340	- 10.0
mumiles/vm	1.1.2					10.0	- 1			1.1	
INCOME.						1.1	1.1			100	1.10
minetia -	1.44			1.14			1.14			- 10	10.44
943,434				1.0000			1.00		104	- 6771	-
10 10 Million 1				1282			- 64		0.044		100
INDERNO.	1.14						1.14			100	- 40
profilmage .				1,000		10	1.00			1/14	112
m0v/mm				4.44			. 18			1.004	
(HEOREE)	1.427	108		101		1.0	1.1			-08	
WOOKS II	1.89	1.144		100			- N			- 75	
an against										14.0	1.00
MARGIN .				. 101							
MUSINE VA	1.114	1.048		1.164			1.114			1000	
005040541	1.18	. M		100							48
an out one		1.194		748		- 4	1.108			2494	. 164
0100.034040	1.1.18					- 3				- 14	
	10.00	1986	58.	MPh .	10.	1815.	yest.	100	16.	10%	100.00
Tori an Annahimat	1.64.00	10.0	1.0	1000		444	14.00			make	10.760

WEAT LOSS COMPONENT INENEDCIMIN, ORTONI	l.	4	1	h	-	1	1	1	1	ł	
ACCESS MANAGE	÷.	÷.	-A.	-	- AL	4	in.	see.	÷.	-	1004
#1AC wilks hot give	Art.			1484		- 444	1.70	4.00			484
BOAR BRANCHING	-415			1966		1.000	101	1.000			470
and the second s	344					- 145	10				1.000
and the second sec	111					1,1996	1.044	. 148			
all setting the setting of the setti	143			1.84		A DECK	- 945	114			who who
phy lother	1100	- 10	1.00	1001			1084	_ IH			
ALCONN.	161			1014			1.76				3407
ASP-WED/	- 094			1.104			100	19			- 844
eternes .	1144			108	1.14		1.000	144			798
PERMIT AND	40			. 10			1.00	1.1			
WELENIA A	16.1						. 110				107
scoch o	374			1.640			100	- 47			1000
PLOSER.	NO.	1.114									
ADDING .	144	1.076		i lat			1.14	- M			1.7%
A DIMAGNESS	101	10%	1.111	15.44			101	145			4102
and the second sec	104	1.04		1.100			611	1.40			1475
as/or/186	-	104		1000				- 10			2400
WINA ADADAD							. 4	10			2.00
	-	18.	86.	105	18.	196	an.	yes.	sit.	-	1004
FOTAL BUILDING	1000	1004		1940	199	4407	1074	1440			589

#### MICHANKAL SYSTEM SIZING

PROJECT & HE JACO'SE HER HER STREET

#### HEADING .

The feature points reports and care prevail first of the state building test too the structure shaded points reach you as for the building the building test and and the structure point of the fact building the contract appendix of the building testimation operation and react is required point of the fact building test and a superfit of them.

#### columi

• For symbolic system could graph by their legal is proved BML of the standard scaling system regardles authority is the standards in (1992) (2014) (17 standards) could gill.

The resulted colors covering space is shall not be too that the control system uniting specify interactions (2008) pightnad in the prevention interaction control for interact the control of

• First coding spread is added to an acceleral banding system, in trajantic in Water, band into based (2010) for at banding spaces in Networks, spread (1972).

From the present or name more that party and to using the totaled using spress space, Aut set except Diffs of the second using spress space, to the total g

I fee science could realize again, to the holding is the Nan-SQL in the initiality ratios

states for they bear of the extension could be setting and the second by the setting by the setting by

Any first the instantial weight priors associly more priors a work hard weights, since if ( 1) priors specified whereas they constrained prior prior prior to see it were a second prior associated by the difference

#### RESULTS

These results have been generated by The TECA Next Loss & Heat Galn Columbativ (VS.00), which is CSA F280 similar

PROVECT # 149-32-07-INE. #36 XAKE STREET 17 CSA A280

• With the permanent of Canaditan Xerometric Approaches connecting an "CM Distay"), 115 Austimit Ward, Scrotta DM Mayr DK, wateriet in separational faire CDA Space", and and a connecting of the regulator approache of CDA Space", and and a connecting of the regulator approache of CDA Space", and and a connecting of the regulator approaches of CDA Space", and and a connecting of the regulator approaches of CDA Space", and and a connecting of the regulator approaches of CDA Space", and and a connecting of the regulator approaches of CDA Space", and and a connecting of the regulator approaches of CDA Space", and and an and a connecting of the regulator approaches of CDA Space", and the regulator approaches of CDA Space", and the regulator approaches of the regulator approaches of CDA Space", and the regulator approaches of the regu

The features and capting leads constrained with this calculation that due the sale resolution of the over. The case is to and the over its spectral profile (2017) 2017 calculation regulation. The Thermite Execution calculated for According of the second on a magnetizable for demanger existences, and others no promotion of descences on any or unique case.

#### BUILDING INFORMATION

CALCULATIONS PERFORMED FOR RACAN PROJECT

CALCULATIONS PERFOR	INFO BY	SOFTWARE LICENSING
NAME	TODG BADOON	COMPANY
COMENNY	TREA	NAME
ADDRESS	123 FAND STREET	and a
CITY	WANK DUNKS	
PROVINCE	RC	
POSTAL CODE	NDV ICA	teca
PHONE	915-323-4587	
EIK .	155 123 5555	
CASAG	TRACKUSARTSCA.CA	and a second
PROJECT #	HG-10-07-M	
ADDRESS:	ATM FAST STREET	ELL FILL
CITY-	OTTARA	a provide the second second
PROVINCE	Distance .	
POSTAL-CODE	828 384	
BUILDING MODEL	EUSTION MISSION	
sitt	NO SITE	
LOT:	NO 021	
DESIGNER OF BUILDAN	GORAWINGS ARCAN	
GATE OF DRAWINGS	Occumber 2	8, 2004
BUILDING ATTACHMEN	Ti Detathed	
NUMBER OF FLOOP LET	VELS 3 NUMB	EX OF STOREYS 2 above grade (Nor Invest-

			14040716-00303	5.66.48	A ANNU STREET
INTATION DATE	104 minute COVING	en.)			
(4010-04)	45.48		1046/7508		25.58
Summer Maan Delhy Ter			WRIDOW SHADING		NC .
vestication patter					
HEATING EXTERN	Variat ai-be	shial aphronishth dash	inter a second		
NOAT OF HOUSE RADIN	INCIDENTIAN OF	NF.			
V Privestar amazon/		ymy.			
ant Trainments / minute	AUDON .	AC160: 5.5, TLA. 885	Josef MA @30Fu		
to file out implificants parties	anisonal P	- 101			
PURCHASED STR. BRIELDIN	10	Salescence, advocate			
LOCAL WIRLS LAURIDING	8	Light local ultrabling.			
LOCAL HOLE DIRE		Light total chariting.			
INDOOR DESIGN TEADER	RATURES		# OF BEDEDOMIN		
interfe	No. 101, 1149		#-DP PEDPUS	6.1	
CDOLE	NLIT 111-44				
OUTDOOR BESING TEM	PERATURES.				
SLATS	NS: 21'T. 18.8'S				
COOLA	VIC.101.00				
SOL TEMPERATU	10.00				
Attached documents					
Assessments and the s	and the second second		0		_
، در نبعه معید	addition for Torked o	فإيدر فيا ومرافز المراد	0		
		مهمر مر محافر محمد	0		
		unungétana in jagn	0		
		anarigitan in page	0		
			0		
		<b>1997</b> - 1997 -	0		
Antongetiene normel (en ) Norme fram the calculary		nendagan in biba	0		
		anangelon et page	0		
		anangelon in page	0		
		-	0		
		anangelona at page	0		
			0		
			0		
		anangelona at page	0		
			0		
			0		
			0		

BUILDING ENVELOPE ELEMENTS	ANGAGE K INCLUDIO AN ANA ANA ANA ANA
WALLS	
) in the first of the first state of the first strength of the fir	n and reaction that (P. Jackson et al. 9, P. Arkada, J. 1997). With the second photon second states in (P. 1997).
a langa sebil alama inak-ang bi sili sebil di karang milanda. Tamang belangkan salah di pertagan penda dian ang ang bi	
CERLINGS	
a strange constituit, man actings, (117-148), (Theory, p. news) constant, Rosen and Society, Net, and an A. (1194-1413)	national of the second s
INTERIOR FOUNDATION WALL	
n de Namel an anticipation and anticipation	$\alpha$ -and shows that the period of $\theta$ is the set of $\theta$
09050 5008	
DRPORES HEADER	
	seruiserts
i vilati i gi anterandi i vilati i gi anterandi	
a ministra (a) and maint a ministra (a) and maint where we a ministra (a) and maint parent in ministra (a) and (a) and constrained parents in ministra (a) and (a) and (a) and (a) and (a) and (a) and (b) and (b) and (b) and (b) and (b) and (b) and (b) and (b) and (b) and	
a ministra (a) and mand a ministra (a) and mand <b>MANDOWN</b> 2 (1995), and change parts (armite - Mandrey) 1 (1995), and (1995) (a) (a) (a) (a) (a)	SHADWIGS
a establish (a) de est escal la constation, de auto-secut <b>MMESCANS</b> a constation de la con	SHADWIGS
n ministra (a) and more and in ministra (a) and more at which is a state of the state provide the state of the in the state of the state provide the state of the interview of the state of the late of the state of the interview of the state of the late of the interview of the state of the interview of the	

#### Charles A. Lower and Second W. Charl, Andrew (and Second Sec

EATLOSS & HEAT GA	(87586)	ingent .			
	THEOREMAN	PLANA (MI)	HEAT LODI		Ars 1014) (venatile v letare)
print was a both participants		488	1000	-	1344
0401-041-041-0400	1	- 144	476	8424	1673
0000000	- C	188	0.000	18	
NOT THAT IS		.84	10279	+1	100
6(MB/H)	18.2	319	and a		1.00
al pressione and the second	- K	440	ARM.	9010	
C(Deeree)		118	1. 1997	-	
arcente !	10	40	101	11.000	3 <del>10</del>
data-law		818	1000.	3178	7934
and contain		198		0.00	1010
(dela)	- X.	140	1990	144	
CONC.	1	1998	1000	1.00	
COMM TH		. 50	1010	44	046
castica	- (k)	100		100	444
GryAAAETNE ;		101	100	395	4744
espike	4	44	6498	104	-
and the second		840	0494	(84)	inet :
INCOMPANY.		1.1.84	2.566.001		
all farmer		AREA	HEAT LONG	0450	eus seeinnel
ATRALL BUILDING		5015	Stain	15,850	#5760



### **NEW CSA F280 REPORT**

CAURED

CSA STANDARD F280-12 COMPLIANCE WE 2019 FEMAL THEIR ATMENTIC STATE STATE AND A DESCRIPTION OF A DESCRIPTIONO	CSA #290-12 Korm Set Vor 24.50	CSA F280-12 INPUT	SUMMARY
These descents insued for the use of NACAN PROJECT	PROJECT #	New According to the set of NRCAN PRODUCT	
and may not be used by any other persons, without authorization. Decements for person and/or construction are repeat to real.	WE-10-07-WE	entries for its and is no other strain, while instantian insurants to per-	NAME AND ADDRESS OF TAXABLE PARTY.
BUILDING LOCATION		A REAL PROPERTY OF A READ PROPERTY OF A REAL PROPER	LOING LOCATION
Raide LLATING MORE Vie NOR	112	Anala Corrow Merral Anal	The state
Addison Octobel (1988) - Aut Sel UK	100	the second se	ULATION BASED
Dy & Promo (21 AAX, Of URC) Program. ER IM	10	Francisco Marine State (1997)	SCATION BASED
	in team and and page 110 carries from other	and the second se	1.1.
ademaka har 🖸 Maka hare 🖉 Mana haring hare 🖉 Maka hare 🖉	(1 min)	National Sector	a Print Long
HEATING		and therein. 21() temp frame)	to Sphrass
Minimum Heating Capacity: \$2,409 BTUH survey	(heimage 127)	Note Dianization	- markete
		Bind Spencer, Stor. Los rings, u/S >20	(incents)
5.51 Version and the second se		and planning light and shelling	(internet)
5.32 satering on early to satering and services		una Grayor a Grayor -	percent in
COOUNS		HEATING DESIGN CONDITION	15.
Nominal Cooling Capacity: 45,760 BTUH Immedia		275, 247 man hope 275, 527	FURAT PURAT
	ing Lowith is period 111	put/put descention.op Robert Setting Sectors of Sectors and Sector	No.
Minimum Cooling Capacity: 19.818. Bruth American Cooling Capacity	\$7,200 BITLAH	ABOVE GRADE WALLS	
8.3.2 Another to accorded in Decard (1.1). The conflig statest quantity shall not for local data BHC of the control promy quantity for the local index to be the more the second analog quantity of the locality meas (HO W 31.31 hors).	ing, an Antonio and in Design 4, b, in receipt	10 DOUGH COMONS AND AND AND AND A STREAM	
a 13 Much file cooling rutters a addector on execting having content. Por capacity is firsts shall not second 30 lines the capacity of the or	handleg reporter of the second system (17)	0.1 Burling number, Sold SM, Sel Naming & 1970, Microsoft April, J. Burling number, Schwartz April 2010, Westand April 2010, Strength	01
provide upports in free, not expected a large entry of an analysis and a prior built in These 5.15. We not that an inter-	A distant second 1778 of the second loading		
8-3.4 reports to the heading an description (lacent 2.5		artituda (1979, 2029), none auto, it UV dials, it forming al serils	
6.3.5 Plan species (and guesting species) to the holding, is interviewed in Dawn 6.0.5, is not the shall if it (1 here), the resulted and species particle species for the holding for us to 1750 M (0.40 here).	and Physics whelp, and becaut prevenuely	mainteen Waar 199, bei fanning itt (P.D. W. away week, J. Venette mannant), huffwaard pleasant, J. Calabitry reporter, fand talleg, naturel	
ATTACHED DOCUMENTS		0.00.000	100.
		FLOOR HEADERS	
Design Summary L1 Accor by Room Results		(J) (HEARS) (1) (2) (2) (2) (3) (HEARS)	- N
Other		OE	01 84
Contact -		INTERNET IN THE VALUE.	4,0
		02.	NR 10.2
and the second se		WINDOWS	
CALCULATIONS PERFORMED BY		B 1 E James Hages, Ville Life, Selds Scholler - Municipal Annuality B 1 E James Hages, Ville Life, Selds Schill	101 m
Nov 1000 14000	and of the logaritht, in the longe	SKYLIGHTS	
15 million	which in the Accumum & I am qualified in the late comparises of	01	L los IVA
	an original a		201 -001
notes 10-00	S		FOUNDATIONS
New Stationed as All and		<ul> <li>IC 1: (2 Bearson / Lower Yord, Byt. Or Deale uncontrol configuration and a 1249' state Statement with Decay of the set (1) and</li> </ul>	10 CALC: 22 CAR
te musum e	Superior 19	III 2 Depriver, Same front General Sol & Hole, Kolenary Paris & Same had reaght of Asia, 1027, Aug. (Specificity, 1038, Oxford) Film.	
and the termineters of	5 11 4		mat be
TECA HEAT LOSS & HEAT GAIN CALCULATOR	VERSION FOR SOFTware	TECA HEAT LOSS & HEAT GAIN	CALCULATO

	JI SUMMART		Form Sat Ver 24 30
we have we have be the set of MRCAN PROJECT			PROJECT #:
a cause for the cavel for one other activate with our sufficient data. Descename for	ULDING LOCATION	610 X 10	ND-10-07-NE
	ULDING LOCATION	11112	wian
	And Terrary 27102405, CARDIN	10 10 10 10 10 10 10 10 10 10 10 10 10 1	NO 101
	CULATION BASED O		Page For Results!
remain his basel (as diverge for to W100	CODATION BROCK		age to senses
	1.1.	324	L.
isheet Selat	a Prost Lang	(m)	a human in
2 (topps 21) (and floors)	to Spenar	++	aunat to
offer Diani Differig	- maintaine		, mar
tial Egymenter, 2001 - taak ringer, 10/1 2-20	a locasto	(#)	, mar a
and therease ages and should be		Re-Balancer	stated in
una E manar a E mana a		54	
HEATING DESIGN CONDITIO	the second s	COOLING DES	IGN CONDITIONS
27. 147 June has 107. 71.0	TUNET PLAT	standing PLET	-hour SLET
fried fermionist, og	Gillor Inn	216	0.0
ABOVE GRADE WALLS	110	BELOW GRADE	and the second s
1 DOUBLE COURSE OF BALL, MILLING AND A STORE OF SHE	14 M	THE POST OF THE REAL	ALP ST SNR. Channel at 11
Lands exception should the ball having a price of carry larger (1) manufactor executed ballances of second 1 Manufactor executed formation (1).		maketer wood 590,540 hands #	
D Manfrey Parentals, "Affaired physicals," ("Scalard Hamada, Complexity, and a statistical manuals," (environment), and the statistical manuals, "Statistical manuals," (Scalard Scalard Sc		ing names. Selected, Aprox. 241	or an address states
STREET VERSIONS, none water // UV disk, // homegin/ or			
12 maintain Water SPE, but having it (2010) Without aught, 2 the manual. Induced planets, 2 Californ Automatic Lond Labor, and			
ULTREAL B	10.		
FLOOR HEADERS		CEILINGS	21 
(1) (million (1) (2) (2) (2) (million (1))		NNO DAWFUL, want writige of 117 deer, Wood: SN, 244 Young, & 1276	
i E		mail. Miniarati which and gives Mare sinte	
CONTRACTOR OF THE OWNER.	44		4
2	AA 10.2		
WINDOWS	1	EXPOSED FLO	
Diffect allocal auto paid constraint - Bundling auto		COL 400005 mate forms of LIP after data attaut SPE 300 homes 8 2013	8. 8 367 CF Classifierg materials
	100	NAME AND ADDRESS OF TAXABLE PARTY.	
SKYLIGHTS	2	DDORS	inflate and which done
1	305	19.11	
	FOUNDATIONS		
	or 4940.1/ Birs (serve & new Select	Land in this Associate from	Committee Book, mic Proceedings (7)
<ol> <li>Branner J, Sound Herd, Byt Dr. Source anomalies in Physics and a Data state state water and particular descent to an</li> </ol>			1
A setta (200) roz Prancika sali territer renerita (20) in Diservice, Senie West Generite Set 5 main societari pare		Collars Text ments constrained right.	minest achiever and insultant
<ol> <li>Helle (1994) Hill Handschie (Hell Deschild Generative Hell</li> </ol>	PARTY IN THE PARTY INTERPARTY	t i an fei men remaner spr.	manhain and a share in the second

old they fell be used for any effect persons, without pull			HG-10-CIT-ME
00000000			
NUMBER OF STREET		e would	
Dig & Provinsio LITTARA, DeCAMO		Harlinte Bill HH	
0	ALCULATION RESULTS - R	OOM BY ROOM (STUH)	
# HOOM NAME	- HEATING	TOTAL DODGING	
1 IFERIC-WALKOUT (SOG)	6,955	5,249	
1 (RERE-WALK OUT (RIM)	4,759	8,617	
> DELINEORATION	1,242	42	
<ul> <li>Interaction</li> </ul>	3,629	630	
+ INSTRACT	1,512	-01	
* (HEL/1796	6,933	9,042	-
+ 1#7303A99G	2,317	4,809	
+ INEPOWDER	644	400	-
+ sevences	2,535	2515	
HE HEROMOTICHEM	581	3,035	-
11 18113000 2	6.907	85	_
11 (#12)@(0.8	4,080	80	
13 DRIDBATH	805	546	
IN ERISABLO 4 IN DRISAMANTER	4.162	14)	-
13 UKINANATUK	1,175	100	
17 181375077560	3,451	1.444	-
H INTELACINGNY	2403	1,000	
pr anger sertert t	2,449 #100 14	114	unit 10.567 alua
wite title intervention	the second s	unter Can Propriet, where the	the local division of
Intel Kelling Heat Loss (5.5.7)	the second s	Auroral Chaing System Capacity (	
Gen page 2 Kert	writing & Conting System Cases its United	and December 24, 2024	AP40 8 8 8



# **CSA F280 REPORTING**

### **Required Input Information:**

- Client & Project Number
- Building Location
- Calculation Assumptions
- Design Temperatures
- Building Envelope Properties
- Contact Information of Designer

	Inputs for prep	Table E.1 aring heat loss and gain calculation (See Clause 7.1 and Annex D.)	summary sheet
1	Title	Description	Example

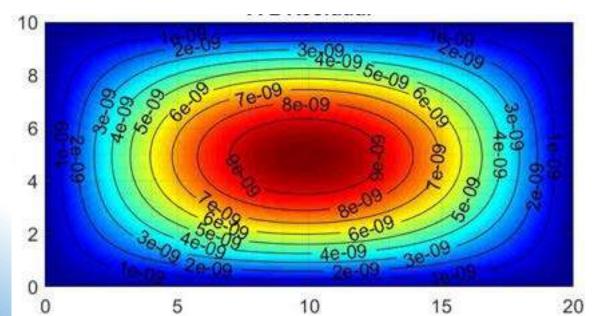
Field	Title	Description	Example				
1	Drawings issued for	Client/company the heat loss gain calculations were performed for	John Doe Construction				
2	Project number	Client/job code for the use of the issuer of the Heat Loss Gain Calculations	0402-96				
BUILDING LOCATION		Where the project is located					
3	3 Model Code or name designated to a p		Craftsman-Walkout- Option 2				
4	Address	Municipal designated location of the project	496 Fake Street				
5	City & Province	& Province City (county, township, etc.) and province the project is located in					
6	Site	Name of the development area the project is located in	Fakewood Heights				
7	Lot	Numbered land parcel within the site	Lot 16, Phase II				
8	Postal Code	Canada Post assigned postal code for the address	M6J 2P9				
CALCU	LATIONS BASED ON	The assumptions and data the heat loss gain calculation is based					
9	Dimensional information based on	Source of the component sizing data for the heat loss gain calculation	Anybody Design. Dwg Dated 7/Oct/2010				
10	Attachment	Building connection to another building's conditioned space	Detached, left/right/ mid, top/bottom/mid				
11	1 Number of stories Floor levels in the building – Indicate if basement is included		2 * basement				
12	Weather location	Weather location Weather data location selected in the heat loss gain calculations					
13	Ventilated?	Was the building's ventilation included in the heat loss gain calculation	Included				
14	HRV?	Is an HRV used for the ventilation of the building?	Yes-Blowhard Cyclon 2WA				



# **CSA F280 LIMITATIONS**

#### **Calculates Peak Loads:**

- Outputs either BTU/hour (or Watts)
  - Energy over **Time**
  - Cannot simulate the build-up of heating over time
  - If the peak load can be satisfied, partial loads will also be satisfied





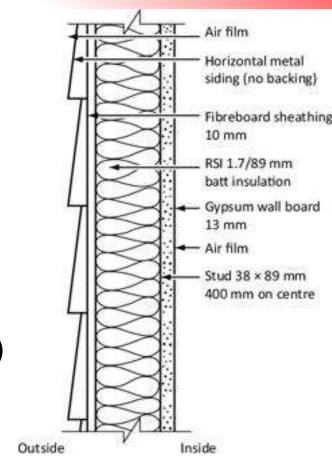
# **ABOVE GRADE WALL CALCULATIONS**

### **Components of the Above Grade Wall Calculation:**

Heat 
$$Loss_{AGW} = \frac{Area}{R} * \Delta T$$

Where:

- Heat Loss [W or BTUH] = Heat loss requirement at peak load
- Area [m<sup>2</sup> or ft<sup>2</sup>] = The area of the wall (adjusted for stud spacing)
- $R\left[\frac{m^2 * C}{W} or \frac{ft^2 * F}{BTUH}\right]$  = Thermal resistance of wall assembly
- ΔT [°C or °F] = Indoor setpoint temperature Outdoor design temperature





# **ABOVE GRADE WALL CALCULATIONS**

The U-value has become more popular, it is also common to express as:

Heat 
$$Loss_{AGW} = Area * U * \Delta T$$

Note: 
$$U = \frac{1}{R}$$



# **FENESTRATION CALCULATIONS**

#### CSA: 6.2.2. Heat gain through transparent & translucent building assemblies

- Solar Heat Gain Coefficient (SHGC)
- Solar Radiation Incident on the Window (based on orientation & latitude)

Heat Gain<sub>CT</sub> = Area 
$$*\left\{\frac{\Delta T}{R} + SHGC * Solar_o * Latitude_{Factor}\right\}$$

		Estimated	solar radiati	on (W/m <sup>2</sup> )		
	North	South	East/West	Northeast/ Northwest	Southeast/ Southwest	Horizontal
Solaro	93	160	285	194	252	534
Latitude <sub>Fa</sub>	$\frac{1}{1}$	+ {Latitud	le – 40} •	* 0.0375		



## **INTERNAL LOADS: CSA F280**

### **External Loads:**

• Conductive heat transfer, solar radiation, ventilation & leakage

### Internal Loads for Heat Gain:

- Occupants: 70 W (240 BTUH) per person
- Electrical:
  - Min. 800 W (2,730 BTUH),
  - 4 W/m<sup>2</sup> (1.27 BTUH/ft<sup>2</sup>) if > 200m<sup>2</sup> (2,150 ft<sup>2</sup>)



## **CSA F280 CALCULATORS**

F280-12 Software Verified according to the procedure set out in F280-12, Section 8.

COMPANY NAME	SOFTWARE NAME	ROOM BY ROOM	WHOLE HOUSE	CONDITIONS	WEBSITE
Building Technology Services	Building Tech #200	Ø	Ø	Click Here	BuildingTech
Avenie Software Inc	HeatCAD/LoopCAD	Ø	Ø	Click Here	HeatCAD Loop€AD
Thermal Environmental Comfort Association	Teca Heat Loss & Heat Gain Calculator	Ø	Ø	Click Here	
Volta Research Inc	Volta Snap		Ø	Click Here	VOITA SNAP
MiTek Inc	Right-Suite Universal	Ø	Ø	Click Here	www.wrightsoft.com
Sustainable HVAC Design Inc	Sustainable HVAC F280	ø	Ø	Click Here	Ø
McCallum HWAC Design Inc	Mecha F280	ø	Ø	Click Here	

Current List of Certified Calculators: <a href="https://hvacdc.ca/?page\_id=406">https://hvacdc.ca/?page\_id=406</a>





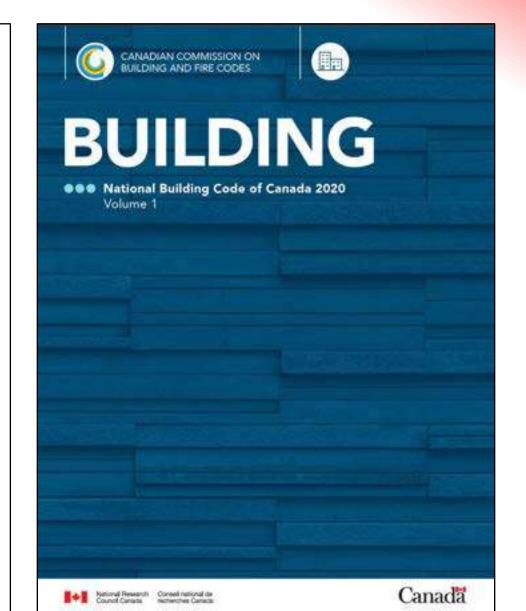


## **BC & NATIONAL CODE REQUIREMENTS**

#### British Columbia BUILDING CODE 2024

Book I: General







# **CODE REQUIREMENTS**

- Heating & Cooling Equipment to be sized using CSA F280-12 standard
- Design temperatures are prescriptive
  - Indoor Setpoint Temperatures
  - Outdoor Design Temperatures
- One room must be able to maintain 26°C
  - <u>\*Applies to BCBC Only</u>



Book I: General





# **CODE REQUIREMENTS: CSA F280**

### 9.33.5.1. Capacity of Heating and Cooling Appliances

 The <u>required capacity of heating and cooling appliances</u> located in a dwelling unit and serving only that dwelling unit, shall be determined in accordance with CSA F280, "Determining the required capacity of residential space heating and cooling appliances" except that the design temperatures shall conform to Subsection 9.33.3.



# **CODE REQ: TEMPERATURES**

### 9.33.3.1. Indoor Design Temperatures

- 1) At the outside winter design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than
  - a) 22°C in all living spaces,
  - b) 18°C in unfinished basements,
  - c) 18°C in common service rooms, ancillary spaces and exits in houses with a secondary suite, &
  - d) 15°C in heated crawl spaces.



# **CODE REQ: COOLING**

#### 9.33.3.1. Indoor Design Temperatures

2) At the outside summer design temperature, **required cooling** 

facilities shall be capable of maintaining an indoor air temperature of

**not more than 26°C** in at least one living space in each dwelling unit.

\*NOTE: Sentence 9.33.3.1. 2) applies only to the BCBC.



# **CODE REQ: OUTDOOR TEMP.**

### 9.33.3.2. Outdoor Design Temperatures

1) The outdoor conditions to be used in designing heating and air-conditioning systems shall be determined in conformance with Article 1.1.3.1.

### 1.1.3.1. Climatic and Seismic Values

- 3) The outside winter design temperatures determined from
   Appendix C shall be those listed for the January 2.5% values.
- 5) The outside summer design temperatures determined from Appendix C shall be those listed for the July 2.5% dry values.

			cm	utic I	heig	Data for				Inthe C	skrible					
Process and	im,	00	egn 74	npara	-	Degree . Cays	-	Dis Ling	Art.	Mat	Arr. 34	Desires. Hain West	1257	e4. 11	-	515.2
Latation			-	.49	1.0%	100	1444.	160	=	index	1.5	Philadelia, Philadelia, Philadelia, 195			4	
		11A C	14	09 70	10			-					*	*		1
Han Caures																ŀ
THE MAN PROME	1040	-80	1.00	100	10	10.00		44.	200	64	40	- 40	24	14	127	6
ADALASTING.	18		1.4			19960	14	14	1555	14	1000	-	24	4.4	4.96	li
Approval	16		- 16	w.	24	2766		428	1855	10	1700	ust i	24	1.7	0.36	1
Abate	4		1.4	10	1.	1100	-	144	1000	14	3000	201	100	14	6.54	1
Among	100	1.66	12	1.41	-20	8700			276	6.3	800	10			0.39	4
Farmer.	-	1.4	1.4	-	10	3080	1.40	100.	1000	1.00	-	- 100	lag.	24	-	li
Gaster Non	440	1.41	1.00	1.00	1.4	4360		44.	100	4.8	100		4.1		1.25	1
Redu Date	100	1.4	5	28		2160	1 a	ue.	-	44	-100	200	24	1.8	0.40	1
Redo Coole		- 14	1.44	10	1.4			144	1000	18	1500	- 100	4.0	1.0	1.20	l
Berglass	100		-04	1.00	10	9400	1.41	14.	100	14	100	-	1.4	6.8	120	li
Cathe Deale		1.00	1.	1.00	- 20	- 8150	1.21	=	100	01	1.000			1	0.20	l
Eargent Pinel	1.00	1.4	15	120	1.	3000	1.4	10	1886	18	1400	100	3.7.1	14	1.41	l
Carte	-	100	i.	1.	12	4790	1.21	-	1.00	1.64	100	100		14	0.30	l
Cempr	-	1.22	12	12			1.2		1	14	122	1.2	1.22		0.50	g
Denvisi	-	1.2	1.	-	14	5800	1.0	- 21	12	44	425				5 30	5
Chillennik	122	1.2	12	1.	12	2780	1.1	- 100	1625	10	1500				1.00	l
Carlwood Region Colectory Colectory Colectory Colectory			4	8		2007	-	100	1000	-111	1000	34	F		1.0	
Energy Vilage		+	1	14	ψ	-340	٠			sim	-	40	12	44	646	ł
Colempo (Transfe Mourtains	10	a.	-		10	200	-	-05	11400	126	100	24	n	0	2.40	1
COR0.	140	1.4.1	1.4	12	1.00	3000	14	100	978	10.	1000	1000	20	6.4	6.0	b
tioning .	16	1.41		28	1.98	2000		404	1400	18:	(all)	- 246	1.0	1.4	4.41	6
Creitmak	100	1.00	-08	100	10	#400	141	100	28.	10.0	400	- 10	11	6.0	4.25	b
Costal Way	0.00	- 10	-		20	1000	14	14	ett.	68	855	80	44	44	128	h
Ender	1	4	14		10	2000			44.		960	-960	1.0	4.2	1.92	b
Date: Cert	44	- 16	100	27	16	6800	14		370	6.8	675	80	28	2.5	0.30	6
Dealer Lane	800	int.	-40	24.	15	8150	16	- 46	205	64	625	90	14	6.1	0.22	i
Dig Case	450	20	-10	24	12	4800	10	48	78	64	379.	100	14	1.1	9.37	1
Durine:	10	4		28	1.00	2000	1.40	800	1000	11	1080	100	1.0	14	0.51	l
EN/	1065	100	4		1.98	4000	124	44	80	65	440	- 100	14	1.2	4.30	1
Farm	1010	1.00	-10		1.10	4756	10	116	945	110	HTS:	40		6.0	0.00	l
For Names		1.00	-40	28	1.4	111	1.48	. 10	105	68	450	10		4.1	1.0	1
Fort St. John	145	1.4	1.00	100	1.10	1990	14	N	100	4.6	415	-	20	4.1	1.29	1
Owner .	1145	ar.	1.	11	12	1000		1	6470	4.0	1000	- 80			4.34	1



## **CLIMATIC DATA**

#### Appendix C Climatic and Seismic Information for Building Design in Canada

Province and	Elev.,	Des	ign Tei	mperat	ure	Forming Degree- Days	15 Min.	Append One Day Rain,	Ann. Rain,	Moist.	Ann. Tot.	Driving Rain Wind	Lo kPa	ow ad, a, 1/	W Press	urly ind sures Pa
Location	m	Janu	iary	July	<mark>2.5%</mark>	Below 18°C	Rain, mm	1/50,	mm	Index	Ppn., mm	Pressures, Pa, 1/5				1077
		2.5% °C	1% ℃	Dry °C	Wet °C			mm					Ss	Sr	1/ 10	1/ 50
British Columbia													-			
100 Mile House	1040	-30	-32	29	17	5030	10	48	300	0.4	425	60	2.6	0.3	0.27	0.3
Abbotsford	70	-8	-10	29	20	2860	12	112	1525	1.6	1600	160	2.0	0.3	0.33	0.4
Agassiz	15	-9	-11	31	21	2750	8	128	1650	1.7	1700	160	2.4	0.7	0.35	0.4
Alberni	12	-5	-8	31	19	3100	10	144	1900	2.0	2000	220	2.6	0.4	0.24	0.3
Ashcroft	305	-24	-27	34	20	3700	10	37	250	0.3	300	80	1.7	0.1	0.29	0.3
Bamfield	20	-2	-4	23	17	3080	13	170	2870	3.0	2890	280	1.0	0.4	0.38	0.5



# **HLHG INPUTS & REPORTS**

• The following slides demonstrate the TECA HLHG calculator

• CSA F280-12 Table E.1. outlines require report information

 Other certified calculators perform the same calculations and can report the information in a standardized form



## **HLHG BUILDING INFORMATION**

#### **DESIGNER & SITE INFORMATION**

Steel	BUILDING INFORMATION	and I I have not a subscription of the	VENTILATION SYSTEM	
The TECA Heat Loss & Heat Gain Calculator VS.04 is F280 Verified Software	define the face and and unlarte being	WHAT IS THIS CALCULATION UNITS FOR 2	ante why continuous and the hansail (for all any worldshor law	STATE ATOM THESE STATE AND A DESCRIPTION OF A DESCRIPTION
	BUILDING ANEA & VOLUME CALCULATOR	SHOW VOLUME	TYPE: Next Remark Verificar (ML), and only estimated backwell	-
USER INFORMATION	THEORY CONTRACTOR DESCRIPTION AND THE POINT	MEASUREMENT DIALEMAN 2082 0 HT + TOTAL BURDING FUSIR AREA	Eshaut Arflow: 50.00	MANAGEMENT IN MANYAGEED NATES
CALCULATIONS PEAFORMED BY	Total Wall Height (h)         8.00         8.00         8.55           PAD Wall Height (h)         5.00         5.00         5.00           Insider Area (h <sup>2</sup> )         346.00         346.00         6.00		Supply Arthony 60.00 CTV AND 6475 ATM	3
ADDRENT TECA NAME Tool too too on too too too too too too too	Headler Helight (T)         3.00         3.00         6.00           Address Vessores (N*)         2.00         0.00         0.00           Total Vessores (N*)         2.00         0.00         0.00	RED # 11" + TOTAL BUILDING VOLUME	SCARCH/SCR THE ARRINGENE VENTILATION REQUIREMENT IN THE WE <sup>14</sup> these search foods are for reference only and not be compliance <sup>14</sup> In factors increase on the anticle area day and the compliance <sup>14</sup> and these increases in provide the constant of the second	r anntillation system design I based as agfiveed design
102 - International Statements	IDRIPLAYS SUMMARY OF OVERALL BOLDING GEOMETRY		HOE BC BUILDING CODE TABLE 5.32.3.5.	(K-OW required)
IMM. Demographics	AREA VOLUMA		required principal writilation capacity per BC duilding Cade	a dig (10)
	COMPRESSION UNITER SPACE TILLS	2	Table 9.52.3.5 (Imperial) Principal Vestilation System: Callance Fair Minimum Air Rear Table International and Principal Action States (2010) Management Action States (2010) Management Action States (2010)	Tahle 9.10.1.5 (MeXel) Policigal Variables Ipstein Education in Missionan Ale Nasi Kale Preming and Ale Mexel Ale 13.1.5.1.0 Mission Ale Max Math. Sci.
PROJECT INFORMATION BUILDING SITE	A C. HIGH OF HEART CREWS 27.00 TO ACC. HIGH OF HEART CREWS 27.00 TO HIGH DESIGN TANK DRAID 27.0 TO HIGH DESIGN TANK DRAID 2	and former()	Heat Asia, R*         0-3         1-3         8-5         0-7         7.9           1000         HI         46         HI         FI         HI         HI <td>Base Ann. af         F. 1         F. 3         F. 3         F. 3         F. 3         F. 4         F. 4</td>	Base Ann. af         F. 1         F. 3         F. 3         F. 3         F. 3         F. 4
WEATHER DATA	AIR TIGHTNESS / INFRITRATION		tables their minimum required exhaust airflow - the actual (initial SHOW ASHIAL 62.2 VENTRATION NEODIMENENTS	
HENDER AND A DESCRIPTION OF A DESCRIPTIO	* when I the conference below that been always the terretory, of the terretory	VALUE IN CONTRACT ON ADDRESS TATES	SHOW CSA F335 VENTLATION REQUIREMENTS	[LL OM required]
		SOCADON: The sector parts and parts	SHOW NATIONAL BUILDING COOF \$30	inguith required Miller Int, MARE Str (CTAR)
Overseen from pounding into a bit scheme from 4 Strange 7.8 10 All transformer 11.0 10 (All scheme from 11.0 (	digital the artight are of the dualing with and of the three options below.	ar ton a	MECHANICAL (HEATING & COOLING) SYSTEMS	
Control Waters fold ( free of	AR TRAFFIC ARE TRAFFIC AR		Type of Neuting System radiant heating to floor in baselinarity	-
PROJECT		3	skubilation piping multitation	
(ADUATION HIS COMMONDER and Area Area Area Area Area Area Area Area	in the art 1977 was value assumed? The party of the inner films		for any party roll to conditioned goes (new	n defined of adjugging to it constituted species)
Deficiency of BLB LINES CRAWNING, M. DATA OF DEVINING, State 21, 2001	EARTING & VENTING PENETRATIONS and the descent of all penetrations below to use of senatization types, we palled forwards		HUMIDITY	narmans 🖸
And international stress international property international property international stress international stress	CAMARINE		CONTRUSTION AND AND THE 138 CONTRUST	CONTRACTOR CONTRACTOR



## **HLHG REPORT: BUILDING INFO**

RESULTS		PROJECT #: Example: 453 West 12th Ave. // CSA F280		PROJECT #: Example, 453 West 12th A
With the permusion of meterine is reproduced for and cooling appliance represented solely by the manner in which the data information of The heating and cooling	These results have been ge (V5.04), which is Verified F. of Canadian Standards Association, (openers form CSA Group's standard CSA-F280-12 (K2K cs. This material is not the complete and of he Standard in its entirety. While use of the r is is presented, nor for any representations a or to purchase standard(s) from CSA Group, ing loads colculated with this colculator for load	nerated by The TECA Heat Loss & Heat Gain Calculator 280 Software ng os "CSA Group"). 178 Resolute Bluet, Toronto, CAL MISW 183, 117) Determining the required capacity of resolected space heating ficial position of CSA Group on the referenced subject, which is motivial has been authorized, CSA Group is not responsible for the red interpretations. No further reproduction is permitted. For more please with store cooproup org or call 3:800-463-6727, we the sole neuponsibility of the user. This too is to aid the user in	· 영화 (1997) 김 승규가 이 영향은 이상 등 것입니다. 이 이 가지 않는 것이라. 이 이 가지 않는 것이다. 이 이 이 이 가지 않는 것이다. 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이 이	LONGITUDE: -123.12 WINDOW SHADING: NO 64, ATRE:0
	damages whatsonier, and offers no guaras	ranmental Comfart Association of BC accepts no responsibility for toe of equipment sizing or configuration.	is the air tightness value assumed? yes BUILDING SITE SHIELDING: Suburban, fore LOCAL WALL SHIELDING: Open flat terrai LOCAL FLUE SHIELDING: Open flat terrai	in, grass
CALCULATIONS PERF NAME COMPANY ADDRESS CITY PROVINCE POSTAL CODE PHONE FAX EMAIL	FORMED BY Todd Backus TECA 123 Fake Street Nanaimo. BC V9R 1P3 SSS-SSS-SSSS - tbackus@teca.ca	SOFTWARE LICENSING COMPANY TECA NAME Todd Backus REG. #: 33816800	INDOOR DESIGN TEMPERATURES: HEATING: 22°C, 71.6°F COOLING: 24°C, 75.2°F OUTDOOR DESIGN TEMPERATURES: HEATING: -7°C, 19.4°F COOLING: 28°C, 82.4°F SOIL TEMPERATURE: 11 °C Attached documents:	# OF BEDROOMS: 2 # OF PEOPLE: 3
PROJECT #: ADDRESS: CITY: PROVINCE: POSTAL CODE: BUILDING MODEL:	Example 453 West 12th Ave. Vancouver 8C VSY 1V4	, egetternet - inschede phone of basise / building dressings there	Assumptions noted (in addition to listed assumptions on p	page 1):
SITE: LOT: DESIGNER OF BUILDI DATE OF DRAWINGS: BUILDING ATTACHMI NUMBER OF FLOOR L	S: March 21, 20 MENT: Detached	124 IER OF STOREYS: 2 above grade floor levels	Notes from the calculator operator:	



# **BUILDING ASSEMBLY INPUTS**

### **Custom Building Assemblies:**

- Walls
- Windows & Skylights
- Doors
- Foundations

CPNT.#	DESCRIPTION		T-m-WADD	quick 8-values - oir films:	quick #-values - she	
11	Air Film - Inude Ploors		0.92	node vah = 0.68	3/4" (Apploate + 0.31) 1/3" (Hy/Catt + 0.43)	
	Mandwood		0.60	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	V/4" ptg/Dell = 0.54	
2%	New York Control of the Control of t		1.12	And all an a \$1.17	1/2" #90- #0.45	=0.25
13	Roor insulation		47.67			080
. 4	Aluminum Board		1.40	quick R-values - wood frame * R-value of framing and cavit		goick R-values
53				2nAgrae 200 (Revalue)	2058/10/01 (Kvaba)	Paralities strate at suffraged [des
63				w/110 = \$.85 w/111 = \$.08	w/4111 = 34.70 w/4111 = 15.54	Filewised will
7				w/#3# - 9.89	w/107 + 26.32	(netai + 0.75
				(R and a tor (R and a l	200(516'05 (R-velue) w//cm = 16.55	
- 17				m/912 = 10.08	W0612 = 17.78	
				migits = 1158.	w//UN = 18.66	
10	Air Film - Outside All		910			
	Int the State		10 50.04	Br-VALLE		
Cielding et	Norsed develo 12 × 184 mm - bogent	A VALUE	nulation, sheathing, clodding, et			
1	ndenah Nusud : Reve = 12 × 184 mm = tapped :	Search pool into	intuicition, frequery, concerning of			
Sur X search h	ntensis Tussed Bene - 12 < 154 mm - topped CCMVP: #	Search pool into				
Sur X search h	adenali Russel devel - 12 - 154 mit - Isopet CCNP: #	Search pool into	insulation, besider (rim (sert), et search (sert into			
2. search h Aniembly	Attention Tessed Revel - 12 < 184 www - tesped COMP. # Save to component        or component - NON-CONTINUOUS MEDIU Type: Tessery with serily invalution and skalls ERAMING   ERAMING	Manual A value	insulation, besider (rim (sert), et search (sert into			
2. search h Aniembly	Attention Tested Revel - 12 < 184 www - tesperal CONF. # Save to component }	Search pool into     Sear	iniulation, beader (rim joint), et search load into 19.20	a Te source		
2. search h Aniembly	adenali Busadi devel - 12 - 184 mei - tagped CCN/P: #	Search pool into	initialization, besider (rim joint), et search load inte 10.00 COMP.	a Te source		
2. search h Aniembly	adenali husadi devel - 12 - 184 mei - tapped CCN/P: e sever his componenti	Search pool into     Search pool into     Search pool into     A value      M     froming & covity      INSULATION      Search Search      Search Search      Search Search      Search Search      Search Search	insulation, header (rim joint), et insulation, header (rim joint), et insulation insula			
2. search h Aniembly	Advented Terresol densel - 12 - 134 mm - tapped COMP: * seven to component. I component NON-CONTINUOUS MEDIU Type: Transporter only involution only sould Type: Transporter only involution only sould Select Type: Indexido persuet Select Type: Indexido persuet	Search pool into     Sear	iniziation, beadler (rim joint), et marith load inte iniziation ini inizion inizion iniz	Component ) Stant for Stant for Stant for Stant for Stant for Stant for		
2. orange fr	Advented Terresonal developed COMP: * seven to component: I component: - NON-CONTINUOUS MEDIU Type: Transporter of NON-CONTINUOUS MEDIU Type: Transporter of NON-CONTINUOUS MEDIU Sevent of Non-Continuity of	Search pool into Search pool into A VALUE IM Proming & covery INSCRATION TEP & OPERATE INSCRATION TEP & OPERATE INSCRATION TEP & OPERATE INSCRATION TEP & OPERATE INSCRATION	insulation, header (rim joint), et insulation, header (rim joint), et insulation insulat	Component   g Sales In r wit sales Ins in & the week sales Ins		
2. oracch h Aguerský Stilp 3.50	Advented Terreter - 12 - 134 mm - tapped COMP: * seven for component: I or component - NON-CONTINUOUS MEDIU Type: transmo with savity invalidation onto Svakity PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUES CONTINU	Search pool into Search pool into COLOUR A VALUE IM Frammp & covey INSCRATION INSCRATION INSCRATION INSCRATION INSCRATION INSCRATION INSCRATION	inturiotion, header (nm yout), et search tout inte 10.20 COMP. COMP. COMP. COMP. COMP. COMP. COMP.	Component ) Stant for Stant for Stant for Stant for Stant for Stant for		
2. oracch h Aguerský Stilp 3.50	Advented Terreter - 12 - 134 mm - tapped COMP: * seven for component: I or component - NON-CONTINUOUS MEDIU Type: transmo with savity invalidation onto Svakity PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUOUS MEDIU PERSONAL CONTINUES CONTINU	Search pool into Search	intuitation, header (rim yout), ef enantiti touti inter 10.00 COMP COMP COMP Compose enantiti compose enantiti e			
2. oracch h Aguerský Stilp 3.50	Advented Terresol densel - 12 - 134 mm - tapped COMP: * seven to component. • NON-CONTINUOUS MEDIU or component. • NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUOUS MEDIU Sevent - NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUOUS MEDIU Sevent - NON-CONTINUOU	Search pool into     Sear	intuitation, header (rim yout), et exactly load inter 10.30 COMP Save to Compose et all compose et all et all et et all et all et all et all			
2. oracch h Aguerský Stilp 3.50	Advented Terreson dense - 12 - 154 mm - tagged CONP. * seven to component. • NON-CONTINUOUS MEDIU or component. • NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUE Type: Type:	Search pool into     Search pool into     Search pool into     Search pool into     Search pool     Searc	intuitation, header (rim yout), et exactly load inter 10.30 COMP Save to Compose et all compose et all et all et et all et all et all et all			
2. unarch h Annembly Stille 3.3 ( Hille 2.3 (	Advented Terreson dense - 12 - 154 mm - tagged CONP. * seven to component. • NON-CONTINUOUS MEDIU or component. • NON-CONTINUOUS MEDIU Type: Transporter - NON-CONTINUE Type: Type:	Search pool into     Search pool into     Search pool into     Search pool into     Search pool     Searc	intuitation, header (rim yout), et exactly load inter 10.30 COMP Save to Compose et all compose et all et all et et all et all et all et all			
2. unarch h Annembly Stille 3.3 ( Hille 2.3 (	Advertabl Turssed devel = 12 < 154 mm - tupped CCM/P: #	Search pool into     Search pool into     Search pool into     Search pool into     Search pool     Searc	intuitation, header (rim yout), et exactly load inter 10.30 COMP Save to Compose et all compose et all et all et et all et all et all et all			
2. march h Aniembly Stille 2.00 eelectron 2.00	Advertabl Turssed devel = 12 < 154 mm - tupped CCM/P: #	Search pool into     Search pool into     Search pool into     Search pool into     Search pool     Searc	intuitation, header (rim yout), et exactly load inter 10.30 COMP Save to Compose et all compose et all et all et et all et all et all et all			

## HLHG REPORT: BUILDING ASSEMBLY

PROJECT #: Example. 453 West 12th Ave.

#### BUILDING ENVELOPE ELEMENTS

#### WALLS

teca

thermal environmental comfort association

> L/ (Wood Wall), Air Film - inside walls, // 1/1° Drywall, // 2° 6, 18° OC w/ 40 insolation, // 2° type 2 bread board as continuous insulation on extense, // L/2° theeting, // Well Material - Softwood, air Him - pintsde air; 29.918 vALUE

#### CEILINGS

1/ (Cefling), Air Him - inside celling, // 5/8 Drywall, // Celling Inscitation, // 1/1" Sheathing, // 2" of type 2 insulation, ## film - outside air, 57 848 VALUE

#### INTERIOR FOUNDATION WALL

#### EXPOSED FLOOR

1/ (/loor - Exposed), Air Trim - mide floors, // Hantwood, // Floor Insulation, // Aluminium Board, air Rim - nutside air; 50.848-VALUE

#### EXPOSED HEADER

I/ (Floor Header w/ Wood Walts), 32.38-VAUUL

2/ (Filori Header w/ Leger Boad), #5.578-VALLE

#### WINDOWS

1/ (Door Window) double glazed, Fixed -- Wood/Winyl, Insulating, clear, Amm Air, USI: 3.13, SHGC: 0.58

2/ (Window - Typ) double glazed, Operable -- Wood/Viny), Involating, clear, firms Air, USF 2 44, (SHGC: 0 49

#### DOORS

#### SHADINGS

SKYLIGHTS

L/(Deor) insulated metal - Polyarethane core, without storm dotr, US(0.9)

#### FOUNDATIONS

L/ (dwamment / Lowent Floce) Concerne Statu & Walle, insulation: anterior wall + 2,72851, interior wall + 2,54853 (configuration 809) // any first storay conditaction type, interior surface of wall insulated over full height, exterior surface of wall insulated over full height, sub-surface of floor slab fully insulated but no insulation under footings, thermal-break between walls and floor slab // AREA 3208<sup>2</sup>, FULL PERMETER 128, EXPOSED PERMETER 208

### <u>WALLS</u>

- 1/ (Wood Wall),
- Air Film Inside Walls,
- 1/2" Drywall,
- 2\*6, 16" OC w/ R6 Insulation,
- 2" Type 2 Bread Board as Continuous Insulation on Exterior,
- 1/2" Sheeting,
- Wall Material Softwood,
- Air Film Outside Air;

#### 29.91 R-VALUE



## **HLHG ROOM INPUTS**

#### Individual Room Inputs:

- Critical to size HVAC distribution systems
- Indoor setpoint temperature can be unique to each room
- Continuous Ventilation?
- Occupants?
- Electrical Loads?

R	OOR A		the second second	APABL	E OF OC	cupyi	NG ALL	PEOPU	in the second	INDOO	S2	100	Allour s	5200 e-1455	NOOW II	r customize r customize INPERATINE	81	¢	or F or F	0 M							
Con V		158 2	HEAT PRO				6 C -		1			23	1110122	2019330		0000000			in the second								
A80	VE G	RADE	& EXPO	SED	BUILD	ING	ELEM	ENTS	(ехро	sed to	uncon	ditio	ed air	)	14	HIDE ADD	TIONA	L WINDO	W INPUT							-+	
-t- SH	EXP	WALL	(11/11")	HEADE	R (#?)	WINS	XXW (f	1				10	DOR (ft)	_	W	INDOW IN	DOOR	(91)		Iwe	NDOW (	10				100	1
	and the owned	191.0	MARAS:)	10	(a) A(c)				w	н 0	D			UW					0 0			U MICK	w	но	D	-	
1	200	2-4	A.C. 1	< <u>1</u>				a de la com		1000	and I. Carro		A stranger	Wi==Wi		a formation	2.14	***=**			1		- 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10	(==///-	-/s/m=1/	N	W.
*																											1
	1	4.0			4	2	¥.		3.0																		
+	1	8.0	1000		8	2	8		4.0																	and and a	덬
	-	4.0	12	2.1	4	3	¥		3.0	4.0																	4
and I		100		12.	1							1994			-											- W	
31	The second se											the second se	the second se										the second se				
		1	-ph	n	dar 1																						
	EXP	CEUN	or: 1071					_	Inco			6	EXPO	SED FLOOR	(11)	1											
×I	1111	CELUN	IG (R*)	SKYUK	arr (#)		দীয	<b>अन्द्र</b> इस					EXPO		(#) Infraw	าสังหลัง											
N	1111	CELUN	or: 1071	SKYUK	arr (#)		ਮ ] ਤ	१९ हम		U/HATCH			-	DIA]	KA62 10	W UNIT											
N	1111	CELUN	IG (R*)	SKYUK	arr (#)		н ]я	१९४] इस					500	DIA]	KA62 10	and an other designed to the second se											
	10	CERIN LACOR	IG (ft")	SKYLK JO	arr (H) V Janu	w1			10	UW	V H		SHE Y	1 24	<u>кио</u> дин ү з	Q F											
P FO	10		IG (ft")		arr (n) Jaco i (eler	nent	s in co	entact	with	U W	bove s		e and l	D A	Y 3	0 F											
P FO		CELLIN A(e)			arr (n) Dienst	nent:	s in co	entact De rist	with previous to	U W	bove s		e and l	1 24	Y 3	0 F											
P FO		CELLIN A(e)	IG (IT')		arr (n) 0 <b>1</b> mil	ment: ne i0 s soni = A	s in co recties el arre o	entact De niek ( noom ij	with previous to	U W	bove s		e and l	D A	Y 3	0 F											
P FO		CELLIN A(e)	IG (IT')		arr (n) Dienst	ment: ne i0 s soni = A	a in co roties # are a LEMEN	intact fre slat (room s) f (°F)	with previous	U W soil, al	bove s		e and l	below so	Y 3	0 F											
₽ FC		CELLIN A(e)	IN ELEM UNDATION ED SLAB AN EXPO	SKYUK JO IENTS HD KEAT SED FC	arr (n) 0 <b>Jan</b> a 5 (eler 1 jann 56 jan o	ment: mei0 s mei0 s mon E	a in co recties a area o LEMEN	intact De piat (room p ( (°F) 1 32	with previolation yournable you	U W	bove s		e and l	D A	Y 3	D F											
₽ FC		DATIO	IN ELEM IN ELEM INDATION D SLAB AN EXPO	SKYUK 30 IENTS FEAT SED FC ISED FC	in (ft) <b>S</b> (election <b>S</b> (election) <b>S</b> (	ments meißs smi = /i non E slab e wall be	s in co profiest af area o LEMEN dg 0 13 dg 0 13 dg 0 13	Intact (room o (°COM o (°C) (°C) (°C) (°C) (°C) (°C) (°C) (°C)	with previous foundation s3	U W soil, al	bove s		e and l	below so	Y 3	D F	tion (mor	nuolo enti	rred								
₽ FC		DATIO	IN ELEM IN ELEM IN ELEM IN ELEM IN ELEM IN ELEM IN ELEM IN ELEM	SKYUK 30 IENTS FEAT SED FC ISED FC	in (ft) <b>S</b> (election <b>S</b> (election) <b>S</b> (	ments meißs smi = /i non E slab e wall be	s in co profiest af area o LEMEN dg 0 13 dg 0 13 dg 0 13	Intact (room o (°COM o (°C) (°C) (°C) (°C) (°C) (°C) (°C) (°C)	with previous foundation s3	U W soil, al	bove s		e and l	below so no ostanov tot 25 p	Y 3	D F	tion (mor	nuolo enti	rred								
P FC		DATIO	IN ELEM IN ELEM INDATION D SLAB AN EXPO Iony total 4 xposed Pr	SKYUK 30 IENT: 4 ID: REA: 1 SED FC RADOLE 4D hell	in (n) i (eler L with S6 pt a IUNDA i (pt abo	ment: ne i0 s ioni = /i non E s slab e wall be we soil	a in co profied are o EMEN dg0 11 ight 6 line 6	Intact (room o (°COM o (°C) (°C) (°C) (°C) (°C) (°C) (°C) (°C)	with previous foundation s3	U W soil, al	bove s		e and l	tot 1 24 below so no octored tot 25 pr 51 pr	Y 3	D F	tion (mor	nuolo enti	rred								
P FC		DATIO	IN ELEM IN ELEM INDATION D SLAB AN EXPO Iony total 4 xposed Pr	SKYUC DENT: REA: 1 SED FC (D hell Let val	in (ft) <b>S</b> (election <b>S</b> (election) <b>S</b> (election)	w ments relias carsi = /i nicon El siab e wall be ve soil suathy:	s in co ecties. # are o EMEN dgo 1 gght 0 line 6	intact free plats (room in 1 (°F) 2 52 3 52 4 52 4 52 4 52 4 52 52 52 52 52 52 52 52 52 52 52 52 52 5	with previous foundation s3	U W soil, al	bove s	** d 2*	e and l	tot 1 24 below so no octored tot 25 pr 51 pr	V 3	D F	tion (mor	nuolo enti	rred								



### **HLHG REPORT: ROOM BREAKDOWN**

#### **Heating System**

#### **Cooling System**

WAL	SMILISO CEL	HOON FLR.	₹ WINDOW &	DOOR & HATCH	NOTADNUON D	LEAKAGE	VENTILIATION	NOLLINBIBLISIO DIST.	A ADDITIONAL	. TOTAL
28	(				28	7 4	8		-	363
127		5	897	1	30	0 20	4 403			1935
62				28	9 40	6 11	6			873
1015			1726	28	9	22	1 403			3655
207	39					1	2			258
291	92		269	6		3	2			684
438	194		1457	8	1	10	3 403			2596
WAL.	CEI.	FLR.	WIN.	DR.	FND.	LEAK	VENT.	DIST.	ADD	TOTAL
2167	325	5	4350	579	993	736	1210			10365
TIMM VAL.	SELING	NOOTA FLR.	SKNIGHT	DOOR & HATCH	Y LEAKAGE	VENTILATION	DISTRIBUTION &	INTERNAL	SUST TOTAL SENSIBLE	TOTAL SENSIBLE
4	100000		- course		0	1/2011/201		655769 - C	4	5
19		1	1857		6	464			2346	3050
8				410	1	0.00 100			420	546
138			3529	255	13	155		3088	7178	9332
27	25				0				53	69
34	61		399						495	644
63	127		2879		10	155		358	3592	4669
VAL.	CEI.	FLR.	WIN,	DR.	LEAK.	VENT.	DIST.	INT. S	ENS.	TOTAL
293	213	1	8664	665	33	773	3	446 1	4087	18314
	62 1015 207 291 438 NAL 2167 TWM AL. 4 19 8 138 27 34 63 /AL	62 1015 207 39 291 92 438 194 <u>NAL</u> <u>CEI.</u> 2167 325 AL. CEI. 4 19 8 138 27 25 34 61 63 127 <u>YAL</u> <u>CEI.</u>	62 1015 207 39 291 92 438 194 NAL CEI FLR. 2167 325 5 MIE OUT AL CEI FLR. 4 19 1 8 138 27 25 34 61 63 127 VAL CEL FLR.	62     1726       1015     1726       207     39       291     92       438     194       1457       NAL     CEI       FLR.     WIN.       2167     325       5     4350       VAL     CEI.       FLR.     WIN.       4     19       138     3529       27     25       34     61       399     63       63     127       VAL     CEI.       FLR.     WIN.	62       28         1015       1726       28         207       39       269         438       194       1457         MAL.       CEI.       FLR.       WIN.       DR.         2167       325       5       4350       579         MAL.       CEI.       FLR.       WIN.       DR.         2167       325       5       4350       579         MAL.       CEI.       FLR.       WIN.       DR.         VAL.       CEI.       FLR.       WIN.       DR.         4       1       1857       8       410         138       3529       255       25       25         27       25       399       63       127       2879         VAL.       CEI.       FLR.       WIN.       DR.         93       213       1       8664       665	62     289     40       1015     1726     289       207     39     269       438     194     1457       MAL.     CEI.     FLR.     WIN.     DR.       2167     325     5     4350     579       993     993     993     993       MAL.     CEI.     FLR.     WIN.     DR.       74L.     CEI.     FLR.     WIN.     DR.       19     1     1857     6       8     410     1       138     3529     255       27     25     0       34     61     399     2       63     127     2879     10       VAL.     CEI.     FLR.     WIN.     DR.       138     227     25     0       34     61     399     2       63     127     2879     10       VAL.     CEI.     FLR.     WIN.     DR.       10     329     213     1     8664	62 $289$ $406$ $11$ $1015$ $1726$ $289$ $22$ $207$ $39$ $11$ $1726$ $289$ $22$ $207$ $39$ $269$ $33$ $3438$ $194$ $1457$ $10$ NAL.       CEI.       FLR.       WIN.       DR.       FND.       LEAK $2167$ $325$ $5$ $4350$ $579$ $993$ $736$ NAL.       CEI.       FLR.       WIN.       DR.       LEAK.       VENT. $4$ $0$ $1857$ $6$ $464$ $8$ $410$ $1$ $155$ $27$ $25$ $0$ $0$ $34$ $61$ $399$ $2$ $63$ $127$ $2879$ $10$ $155$ $426$ $513$ $155$ $33$ $773$	62       289       406       116         1015       1726       289       221       403         207       39       12       32       32         438       194       1457       103       403         MAL       CEI       FLR.       WIN.       DR.       FND.       LEAK.       VENT.         1017       325       5       4350       579       993       736       1210         NOLLY HARSON OR STOP       993       1857       10157         4       1       1857       6       464       16	62       289       406       116         1015       1726       289       221       403         207       39       12       32       32         438       194       1457       103       403         NAL       CEL       FLR.       WIN.       DR.       FND.       LEAK.       VENT.       DIST.         2167       325       5       4350       579       993       736       1210       DIST.         7107       325       5       4350       579       993       736       1210       DIST.         7407       325       5       4350       579       993       736       1210       DIST.         7407       CEL       FLR.       WIN.       DR.       LEAK.       VENT.       DIST.       INT.       S         74       1       1857       6       464       1       3088       <	62         289         406         116           1015         1726         289         221         403           207         39         12         32         32           438         194         1457         103         403           NAL         CEI         FLR         WIN.         DR.         FND.         LEAK.         VENT.         DIST.         ADD           2167         325         5         4350         579         993         736         1210         736         1210         736         736         736         736         730         736



### **HLHG REPORT: SUMMARY**

HEAT LOSS & HEAT GA	AIN SUMMARY, (	BTUH)	imperial	
ROO <mark>M NAME</mark>	FLOOR LEVEL	FL AREA (ft <sup>2</sup> )	HEAT LOSS TOTAL	HEAT GAIN SENS. TOTAL (sensible + latent)
(#1)Bath #1	1	84	363	4 5
(#2)Bed #1	1	180	1935	2346 3050
(#3)Entrance - Basement	1	80	873	420 546
(#4)Kitchen & Living	2	344	3655	7178 9332
(#5)Bath #2	3	40	258	53 69
(#6)Hall & Laundry	3	89	684	495 644
(#7)Bed #2	3	215	2596	3592 4669
		AREA	HEAT LOSS	GAIN (sens.) GAIN (total)
OVERALL BUILDING		1032	10365	14087 <b>18314</b>



#### **Results Output Page:**

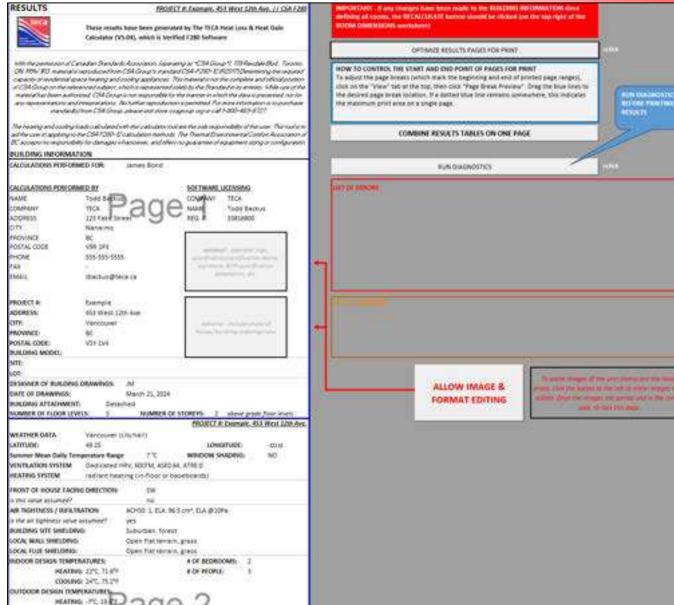
• Automatically creates a report

• Contains critical design information (per CSA Standard)

 Results page submitted to Building Official

### **HLHG REPORT**

1000 MIG: 29°C 828'F





## **REVIEWING HLHG RESULTS**

#### **VERIFY THE FOLLOWING:**

- ✓ Outdoor Design Temperature
- ✓ Indoor Setpoint Temperature
- Building Construction (R-Values & Glazing Coatings)
- ✓ Building Assembly Element Areas
- ✓ Building Floor Plan Area & Perimeters of Walls
- Correct Orientation of Building
- Building Latitude
- ✓ Ventilation System
- ✓ Air Tightness
- Mechanical System

CSA STANDARD F280-12		20002	CSA F280-12 Form Set Ver 24.10
NOT 2015 BUILT & BUILT & BUILT AND	104.04.04.04.04.04.04.04.04.04.04.04.04.0	Sec. 199.15	PROJECT #
information and the second for the same of a second s	for same and so that some	and the state and	i l
	ILDINGLOCATIO		
	1204		
Address: 212 Skosta for M	100		
in-& Rowing Kationes, M	Finiter Gale		
	COMPLIANCE	lin ju	a r far rand harmony and page 5 for more by reaso of
anista k tv 🔲 West bace 🛛 Runnits Room	e jae	1 mart 1	Merry Merry
	HEATING	1000	
Misimum Heating Capicity:	10.168	ATURA MARK	and driving from the local game of 2.7%.
second design of the state of the second			
3.3.1 No can see man intervent of the second direct second of the	and has been an over a	Contraction results	The state of the second s
5.3.2 The compared training ordivers of the training systems that series a run score submettal, so page 2 for instruction specificating requiremental		than 200% of the game has	tion, an americana h Davie 5.3.6. (9 reach)
	COCUNG		
		-	
Nominal Cooling Capacity:	10,577	BTUH (	or Contrary Capelity asser 8.5.12
Minimum Coding Capacity: 24.662 BI	NH e Ma	uimum Cooling Capa	city: BL221 BTURE
Any Depart as provident or Clause 8.2.3, the clubing summer capacity shall be	of he less that 10% of the in-	and planet particular bet	behalling as provinced to Gauge 8.1.1. And
4.5.2 case shall it be less than the remainal useing opeons of the hubbing in		ALC: NOT ALC	
Where the coulorg untert is active to an existing heating cyclem, #3 of	capacity of Water shall not do	cased 18 Names The Connection	of the ser-freeding capacity of the easting tasks
6.5.3 Un classing upperts in Tark net more than 1.0 per 430 CBU of an har			
6.3.4 Smaplifier pround-costs and wear sound have purgle used for south	og, wood as partnettent in Dana	a 3.5.2, the evaluation loading	preparity shall not passed L25% of the controls
combing comments to the building, as arrentment in Saura 8.3.2			
6.3.5 If the numberal society system capacity for the building, so determined content cooling lattern capacity for the building logitic (250 W (5.9		(000 W (L.7 NPN, THE PARK	una icoladi shupan 1000cgi usel encant pre-
ATTA	ACHED DOCUME	NTS	
Design Summary 🛛 Ream by Room Res	-		
C centre summery Co news of women and	6. E		
itter.			
Sofe:			
Acceptone			
CALCUL	ATIONSPERFOR	MED BY	
			Antires byte
diasts a		A. H	of tentent and take representing, for the image
atres 2011 Fuls Pics #		11 1	ris described to this document & i am availant in ensembles (alternation) of
ny Libra Dalaata, II. a	ULATOR V3.08	A E	DOC
use (see)	and all	E	ariana marka (
Name and WI TETI	A and		# 90. ·
M	1 50	6	19
inal anyrethease se	4	(14 M	pc 1 H 4
NINA			21
	ULATOR VS.08		ANNE MARCHINE OF CAMAD
This calculator is CSA F280 verified			VENING F288 SOFTWAY



### **BUILDING ASSEMBLY ERRORS**

### Ensure Building Construction Elements (R-Values & Glazing Coatings):

- Meet Code Requirements
- Match the Architectural Plans
- Are <u>NOT</u> Modified During Construction
- Noted on the HLHG Report

#### BUILDING ENVELOPE ELEMENTS

WALLS	
1/ (Wood Wall), Air Film - Inside walls, // 1/2" (Irywall, // 2*6, 36" OC w/ 3/2" Sheeting, // Wall Material - Softwood, air film - outside air; 29.938-	NG Visulation, // 3° tape 3 bread board as continuous insulation on exterior, / VALUE
CEILINGS	
1/ (Ceiling), Air Film - Jeside ceiling, // S/8 Drywall, // Ceiling Insulation, /	/ 1/2" Sheathing, // 2" of type 2 insulation, air film - outside air, 57 848 viku
INTERIOR FOUNDATION WALL EXPOSED FLOOR	
L/ (Floor - Exposed), Air Film - Holde Boors, // Hardwood, // Floor Insulat	ton, // Aluminum Board, air film - outjude air; 50.848-044.08
EXPOSED HEADER	
I/ (Floor Header w/ Wood Walk); 32 3P VALUE	
2/ (Floor Header w/ Leger Boad), 15.378-VALUE	
WINDOWS	SKYLIGHTS
2/ (Door Window) double glaced. Fixed — Wood/Vinyl, Insulating, clear, 6mm Air, USI 3.33, 5HGC 0.58	
2/ (Window - Typ) double glazed, Operable — Wood/Viny), mulating: clear, firm Air: USI 2.44, SHGC: 0.48	

#### DOORS

SHADINGS

1/(Dooi) insulated metal — Polyamthane zone, without storm door USE 0 91

#### FOUNDATIONS

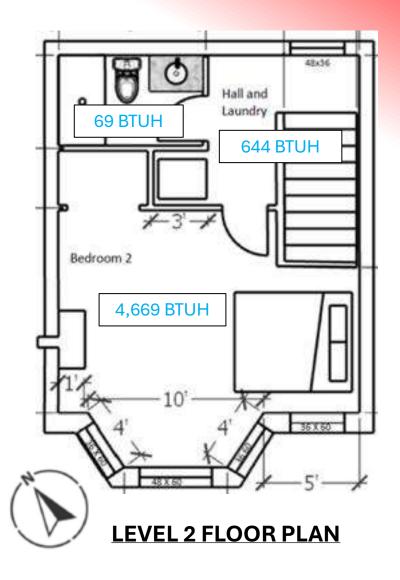
I/(Basement / Lowest Poor) Concrete Slab & Walls, insulation: interior wall = 2.7283, exterior wall = 2.6693 (configuration 869) // any first storey construction type, interior surface of wall insulated over full-beight, exterior purface of wall insulated over full-beight, sub-surface of floor slab follo mulated but no insulation under footings, thermal-break between walls and floor slab // A86A-120M<sup>2</sup>, PULL PERMETER, 72H, EXPOSED PERMETER, 72



## **FENESTRATION ERRORS**

- Windows & Skylights are often the <u>highest</u> heat loss and heat gain components.
  - Mistakes inputting window sizes can result in equipment sizing and poor distribution systems
  - Skylights have a huge impact and must be included

HEAT GAIN COMPONENT BREAKDOWN, (BTUH)	TIVM	CELING	FLOOR	WINDOW & SKYLIGHT	DOOR & HATCH	LEAKAGE	VENTILATION	DISTRIBUTION & ADDITIONAL	INTERNAL	TOTAL SENSIBLE	TOTAL SENSIBLE + LATENT
ROOM NAME	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST.	INT.	SENS.	TOTAL
(#1)Bath #1	4					0				4	5
(#2)Bed #1	19		1	1857		6	464			2346	3050
(#3)Entrance - Basement	8				410	1				420	546
(#4)Kitchen & Living	138			3529	255	13	155		3088	7178	9332
(#5)Bath #2	27	25				0				53	69
(#6)Hall & Laundry	34	61		399	_	2				495	644
(#7)Bed #2	63	127		2879		10	155		358	3592	4669
	WAL.	CEI.	FLR.	WIN,	DR.	LEAK.	VENT.	DIST.	INT.	SENS.	TOTAL
TOTAL BUILDING	293	213	1	8664	665	33	773		3446	14087	18314
			2.5		MININ	NUM IN	STALLE	OUTP	UT CAP	ACITY:	14651





## **BUILDING ORIENTATION ERRORS**

### **Orientation Example:**

- 20' x 20' Building
- 1 Door & 1 Window per Side

#### **Solar Heat Gains:**

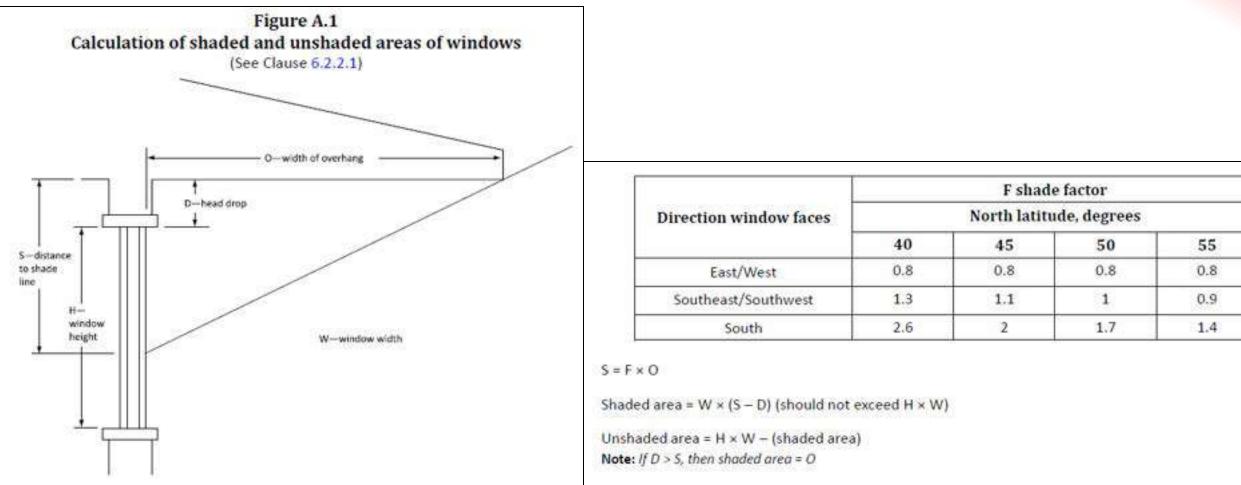
- <u>Heat Gain</u> calculations are heavily impacted by building orientation
- Heat Loss calculations are NOT impacted by orientation.

HEAT GAIN COMPONENT BREAKDOWN, (BTUH) ROOM NAME	MALE WAL	ELING	HOOTH FLR.	SKYUGHT	DOOR & HATCH	LEAKAGE	NOULAINON VENTIATION	ADDITIONAL	INTERNAL	SENSIBLE	TOTAL SENSIBLE
(#1)North	1	59		534	1	1	77		802	1475	1918
(#2)East	39	59		1432	37	1	77		802	2447	3181
(#3)South	12	59		1072	12	1	77		802	2035	2645
(#4)West	39	59		1432	37	1	77		802	2447	318
	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST.	INT.	SENS.	TOTAL
TOTAL BUILDING	91	237		4469	87	4	309		3207	8404	10925
					a starter of						and the second se
					MININ	IOM IN.	STALLEL	OUTPL	JT CAP	ACITY:	8740
HEAT LOSS COMPONENT	í						STALLEL	19999			8740
BREAKDOWN, (BTUH)	WAIT	GEILING	HOOTH FLR.	≤ WINDOW &	DOOR & HATCH	NOTADNUC PUP	JODANE I	VENT.	NOLLINBIALSIG DIST.	ACTTY:	8740 TOTA
HEAT LOSS COMPONENT BREAKDOWN, (BTUH) ROOM NAME (#1)North	WALL	Setting 90	HOOTH FLR.	1.000	DODR & HATCH	FOUNDATION	LEAKAGE	VENTILATION	DISTRIBUTION	ADDITIONAL	тота
BREAKDOWN, (BTUH) ROOM NAME	WAL	CEI.	NOOTA FLR.	WIN.	DOOR & HATCH	FOUNDATION	BEAKAGE	NOTIATION	DISTRIBUTION	ADDITIONAL	TOTA 168
BREAKDOWN, (BTUH) ROOM NAME (#1)North	WAL 196	<b>CEI.</b> 90	HOOTI FLR.	WIN. 718	DOOR & HATCH	NOLLAUNDATION END.	LEAK.	VENT. 202	DISTRIBUTION	ADDITIONAL	TOTA 168 163
BREAKDOWN, (BTUH) ROOM NAME (#1)North (#2)East	WAL. 196	CEI. 90 90	HOOTH FLR.	WIN. 718 718	ногов & натсн 188 188	NOLLYGNIOJ FND. 266 266	39977931 LEAK. 28 28	VENT. 202 202	DISTRIBUTION	ADDITIONAL	TOTA 168 168
BREAKDOWN, (BTUH) ROOM NAME (#1)North (#2)East (#3)South	WAL. 196 196	CEI. 90 90 90	HOOTH FLR.	WIN. 718 718 718 718	DOOR & HATCH 188 188 188	NOLLYGNING FND. 266 266	100XX931 LEAK. 28 28 28	VENT. 202 202 202	DISTRIBUTION	ADDITIONAL	



### **OVERHANGS**

- Latitude Impacts the Effectiveness of Overhangs
- The inclusion of overhangs is not required, omission will be conservative





### **BLINDS & SHADINGS**

#### Blinds & Shadings can be included to reduce Heat Gain loads

#### WARNING: I do not recommend!

Relies on user input



Table 4 Curtain/blind shading factors (See Clauses 3.2, 6.2.2.2, and B.6.2.2.1)

Tume of interior cheding	Type of glazing systems								
Type of interior shading	Single	Double	Triple	Heat mirror					
Interior blinds, curtains, etc.	0.50	0.55	0.57	0.60					
Interior reflective metallic blinds or screens	0.35	0.37	0.40	0.44					
Exterior roll shutters and screen shadings	see Notes 1) and 2)	see Notes 1) and 2)	see Notes 1) and 2)	see Notes 1) and 2)					

#### Notes:

- Between pane reflective metallic blinds, and exterior shutters and screen shadings could generally be treated as walls with respect to solar gain, since the amount of solar transmitted is a small part of the load. In that case, the insulation value of the shade should only be added to the insulation value of the external shutter or shade.
- 2) For exterior shutters and screen shadings, use manufacturer's data when available. To account for both solar and conductive gains, refer to "Guidelines for Effective Residential Solar Shading Devices", Laouadi, A., National Research Council of Canada, March 2010, IRC-RR-300.



## **VENTILATION ERRORS**

- Only the Principal Ventilation System to be included
  - <u>Do not</u> include all ventilation fans in the dwelling
- Select the correct type of ventilation (HRV or Bath Fan)
  - HRV efficiency impacts the load

Principal Ventilati For	ming part of				Nate
	1	Minimu	m Air-Flow	Rate, L/s	
		Num	ber of Bedr	ooms	
Floor Area, m <sup>2</sup>	0-1	2 - 3	4 - 5	6 - 7	>7
< 140	14	21	28	35	42
140 - 280	21	28	35	42	49
281 - 420	28	35	42	49	56
421 - 560	35	42	49	56	64
561 - 700	42	49	56	64	71
> 700	49	56	64	71	78

Table 9.32.3.5 (Imperial) Principal Ventilation System Exhaust Fan Minimum Air-flow Rate Forming part of Sentence 9.32.3.5.(1) Minimum Air-Flow Rate, CFM Number of Bedrooms Floor Area, ft<sup>2</sup> 0-1 2 - 3 4-5 6-7 >7 <1507 30 45 60 75 89 1507 - 3025 89 45 60 75 104 3025 - 4532 60 75 89 104 119 4532 - 6039 75 89 104 119 136 6039 - 7535 89 104 119 136 151 >7535 104 119 136 151 166 Floor areas for ventilation system sizing should include all heated floor areas, and open to below areas



# SHORT BREAK! FOLLOWED BY EXAMPLES



### **CSA F280 HLHG EXAMPLE**

#### Site Information:

- Vancouver, BC
  - -7°C Winter Design Temperature
  - 28°C Summer Design Temperature
- 3 Story, 3,067 ft<sup>2</sup> detached home
- Indoor setpoint temperature modeled at <u>26°C for cooling</u>
  - CSA F280 specifies indoor setpoint of 24°C for cooling
- Net Zero building assemblies
- 5 Occupants
- HRV: 110 CFM with 82% ASE
- No window shades included

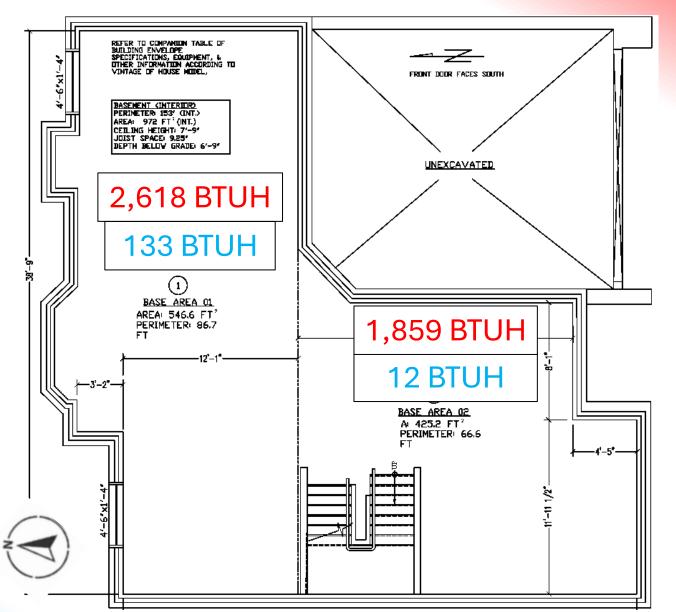


### **BASEMENT PLAN**

Heat Loss (Heating): 4,477 BTUH

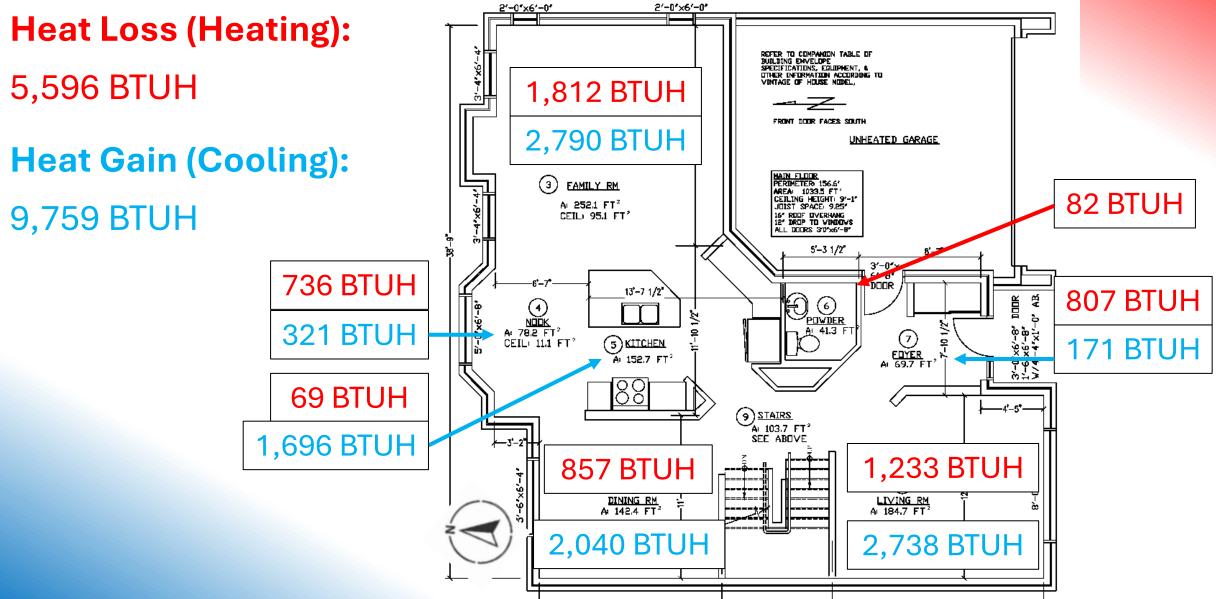
Heat Gain (Cooling): 145 BTUH

\*Mostly below grade





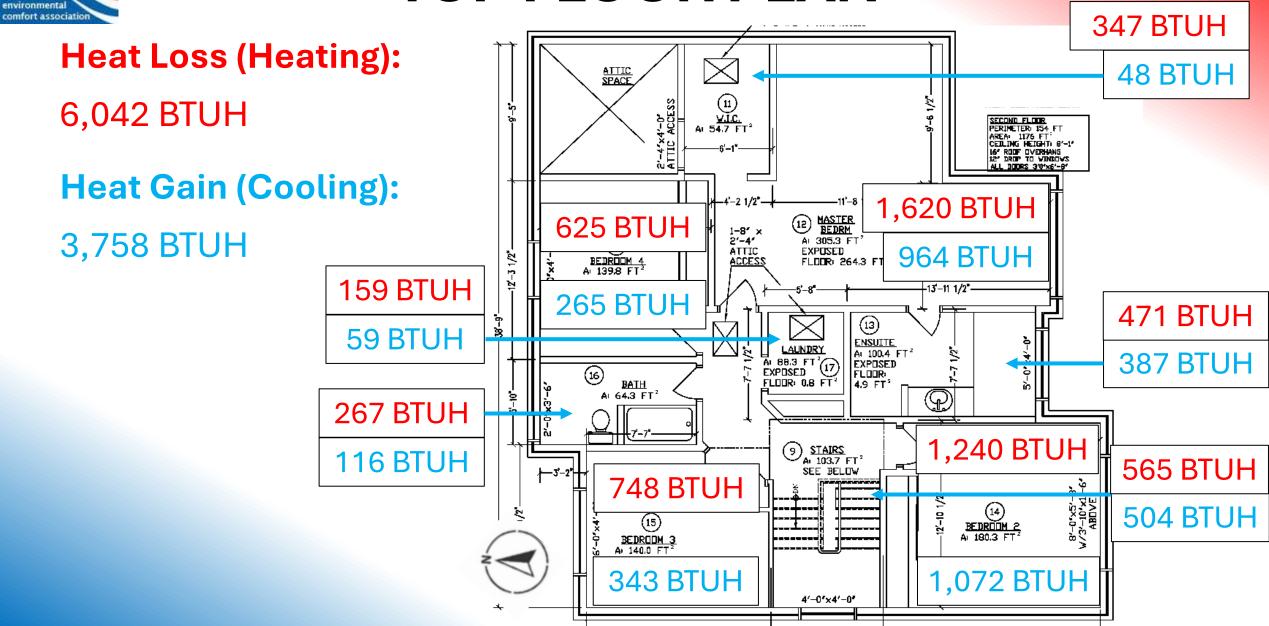
### **MAIN FLOOR PLAN**



# **TOP FLOOR PLAN**

teca

thermal





### **HEAT LOSS SUMMARY**

Temp. @ -7°C
Heat Loss:
16,115 BTUH

environmental comfort association	ROOM NAME	WAL.	CEI.	FLR.	WIN.	DR.	FND.	LEAK.	VENT.	DIST.	ADD.	TOTAL
	(#18)BASE AREA 1	76			153		1262	803	324			2618
Vancouver:	(#18)BASE AREA 2	58					1001	570	230			1859
	(#18)FAMILY	542	85		845			242	98			1812
Temp. @ -7°C	(#18)NOOK	162	10		426			98	40			736
	(#18)KITCHEN	56						9	4			69
	(#18)POWDER	67						11	4			82
	(#18)ENTRY	138			183	334		108	44			807
	(#18)LIVING	320			681			165	67			1233
Heat Loss:	(#18)STAIRS	163	92		204			76	31			565
	(#18)DINING	252			445			115	46			857
16,115 BTUH	(#18)W.I.C.	143	45			110		35	14			347
	(#18)MASTER BEDROOM	335	272	269	516			162	66			1620
	(#18)ENSUITE	55	89	5	255			47	19			471
	(#18)BEDROOM2	252	160		653			124	50			1240
	(#18)BEDROOM3	212	125		306			75	30			748
	(#18)BATH	84	56		89			27	11			267
	(#18)LAUNDRY		72	1		64		16	6			159
	(#18)BEDROOM4	207	124		204		h a	63	25			623
		WAL.	CEI.	FLR.	WIN.	DR.	FND.	LEAK.	VENT.	DIST.	ADD.	TOTAL
	TOTAL BUILDING	3121	1130	275	4960	509	2262	2747	1110			16115



Vancouver:

Temp. @ 28°C

### Heat Gain: 13,659 BTUH \*Indoor temp @ 26°C

### **HEAT GAIN SUMMARY**

ROOM NAME	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST.	INT.	SENS.	TOTAL
(#18)BASE AREA 1	7			88		2	6			103	133
(#18)BASE AREA 2	9					0	1			10	12
(#18)FAMILY	27	50		706		14	45		1305	2146	2790
(#18)NOOK	8	6		216		4	13			247	321
(#18)KITCHEN									1305	1305	1696
(#18)POWDER											
(#18)ENTRY				122		2	7			132	171
(#18)LIVING	29			715		13	43		1305	2106	2738
(#18)STAIRS	21	54		286		6				388	504
(#18)DINING	20			226		4	14		1305	1569	2040
(#18)W.I.C.	8	26				1	2			37	48
(#18)MASTER BEDROOM	26	159		504		12	40			741	964
(#18)ENSUITE		52		225		5	16			298	387
(#18)BEDROOM2	24	94		648		14	44			824	1072
(#18)BEDROOM3	17	73		156		4	14			264	343
(#18)BATH	4	33		45		1	5			89	116
(#18)LAUNDRY		42				1	2			45	59
(#18)BEDROOM4	13	73		104		3	11			204	265
	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST.	INT.	SENS.	TOTAL
TOTAL BUILDING	212	663		4041		88	285		5218	10507	13659



### SINGLE ROOM CALCULATIONS

#### 9.33.3.1. Indoor Design Temperatures

2) At the outside summer design temperature, **required cooling** 

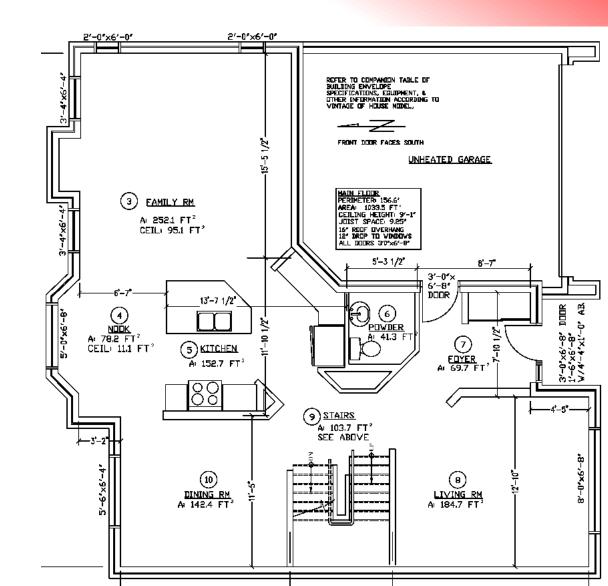
facilities shall be capable of maintaining an indoor air temperature of

**not more than 26°C** in at least one living space in each dwelling unit.



## **SELECTING A SINGLE ROOM**

- Must be a finished room
- Can this room be isolated
- Window shades available
- Consider occupant comfort
  - How is the ventilation in the room
  - How will the occupants use the room
  - Consider how many ft<sup>2</sup> per occupant

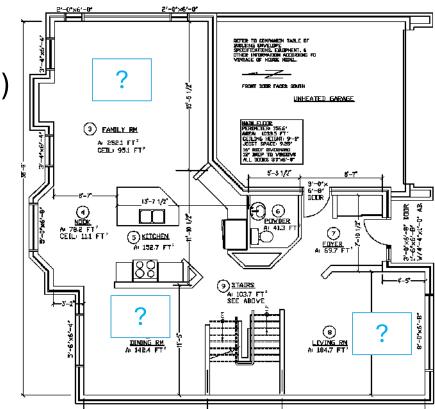




## **MODELING A SINGLE ROOM**

#### How to Model a Single Room to HVAC DC & TECA Standard:

- Calculate heat gain on the single room (must have doors)
- Interior surfaces assumed to be at outdoor design conditions
- Include all dwelling occupants in the single room
- Assume a min. electrical load of 800 Watts (2,730 BTUH)
- Indoor setpoint temperature of minimum 26°C
  - CSA F280 recommends <u>24°C</u>
- Include ventilation system

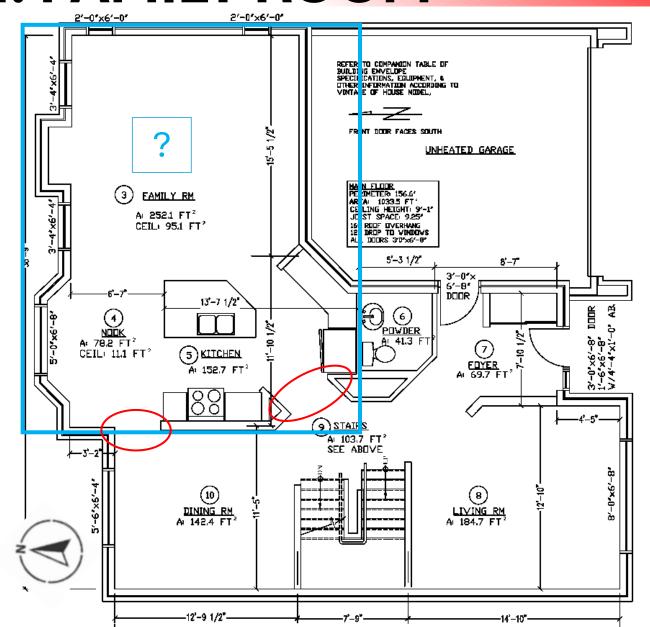




## SINGLE ROOM: FAMILY ROOM

### Family, Kitchen & Nook for Single Room Cooling:

- High occupant comfort level
- Cools a large area
- Requires doors to be added!





## FAMILY ROOM COMPARISON

ROOM NAME	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST.	INT.	SENS.	TOTAL	Family & Kitchon Hoat Caint
(#18)BASE AREA 1	7			88		2	6			103	133	Family & Kitchen Heat Gain:
(#18)BASE AREA 2	9					0	1			10	12	
(#18)FAMILY	27	50		706		14	45		1305	2146	2790	4,807 BTUH
(#18)NOOK	8	6		216		4	13			247	321	
(#18)KITCHEN	1	· · · · · · · · · · · · · · · · · · ·							1305	1305	1696	
(#18)POWDER												
(#18)ENTRY				122		2	7			132	171	
(#18)LIVING	29			715		13	43		1305	2106	2738	Family & Kit. as Single Room:
(#18)STAIRS	21	54		286		6	21			388	504	
(#18)DINING	20			226		4	14		1305	1569	2040	10,988 BTUH
(#18)W.I.C.	8	26				1	2			37	48	
(#18)MASTER BEDROOM	26	159		504		12	40			741	964	
(#18)ENSUITE	2002 Parts	52		225		5	16			298	387	
(#18)BEDROOM2	24	94		648		14	44			824	1072	
(#18)BEDROOM3	17	73		156		4	14			264	343	
(#18)BATH	4	33		45		1	5			89	116	
(#18)LAUNDRY		42				1	2			45	59	
(#18)BEDROOM4	13	73		104		3	11			204	265	<u>CSA F280-12</u>
TOTAL BUILDING	WAL.	<u>CEI.</u> 663	FLR.	WIN. 4041	DR.	<u>LEAK.</u> 88	VENT. 285	DIST.	<u>INT.</u> 5218	<u>SENS.</u> 10507	TOTAL 13659	Indoor temperature is 26°C rather than 24°C
TOTAL BOILDING	212	663		4041		88	285		5218	10507	13659	
			W	AL.	CEI.	<u> </u>	LR.	WI	<u>N.</u>	DR.	LEAK	<u>K. VENT. DIST. INT. SENS. TOTAL</u>
Family, Nook & Kitchen			2	73	293	2		92	0	107	13	285

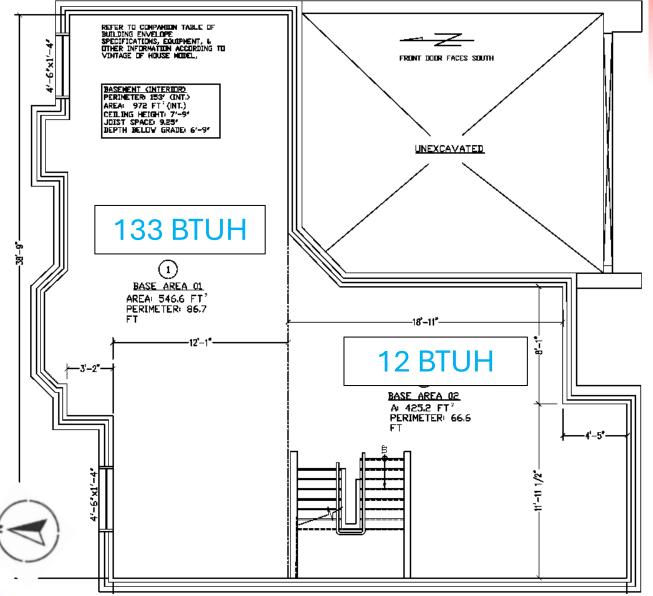


### **BASEMENT PLAN**

# Why not use the basement for cooling?

- Must add internal loads
  - Add 3,924 BTUH
- Heat transfer from above
- No doors to stairs
- Poor occupant comfort

 Does this area even require cooling?





## WHEN COOLING IS REQUIRED

### Move the same house to different locations!

#### Site Information:

- 3 Story, 3,067 ft<sup>2</sup> detached home
- Indoor setpoint temperature modeled at 26°C
- Net Zero building assemblies
- 5 Occupants
- HRV: 110 CFM with 82% ASE
- No window shades included



### **HEAT GAIN COMPARISON**

#### CSA F280 will always return a heat loss & heat gain value for the peak load

HEAT GAIN COMPARISON TABLE								
LOCATION	OUTDOOR SUMMER DESIGN TEMPERATURE	LATITUDE	HEAT GAIN CALCULATED (REQUIRED COOLING LOAD) [BTUH]					
Alert, Nunavut	13°C	82.48	5,382					
Baker Lake, Nunavut	23°C	64.32	10,774					
Corner Brook, Newfoundland	26°C	48.95	12,480					
Dawson City, Yukon	26°C	64.07	12,587					
Toronto, Ontario	31°C	43.65	15,441					
Vancouver, British Columbia	28°C	49.25	13,659					



Alert: Temp. @ 13°C

# Heat Gain: 5,382 BTUH

### **ALERT HEAT GAIN EXAMPLE**

ROOM NAME	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST. INT.	SENS.	TOTAL
(#18)BASE AREA 1				9		-5	-10		-6	-8
(#18)BASE AREA 2										
(#18)FAMILY		6		275		-149	-314	1305	1122	1458
(#18)NOOK		1				0	-1		0	-1
(#18)KITCHEN								1305	1305	1696
(#18)POWDER										
(#18)ENTRY				46		-25	-52		-30	-39
(#18)LIVING				363		-193	-406	1305	1068	1388
(#18)STAIRS		6		180		-99	-209		-122	-158
(#18)DINING								1305	1305	1696
(#18)W.I.C.		3				-2	-3		-2	-3
(#18)MASTER BEDROOM		19		259		-148	-311		-181	-236
(#18)ENSUITE	6			113		-64	-134		-101	
(#18)BEDROOM2	11			330		-182	-382		-289	
(#18)BEDROOM3	9					-5	-10		-6	-7
(#18)BATH	4					-2	-4		-3	-3
(#18)LAUNDRY	5					-3	-6		-4	
(#18)BEDROOM4		9		Į.		-5	-10		-6	-7
	WAL.	CEI.	FLR.	WIN.	DR.	LEAK.	VENT.	DIST. INT.	SENS.	TOTAL
TOTAL BUILDING	1.202 3.5	78		1577		-882	-1851	5218	4140	5382



## **COOLING REQUIREMENTS**

#### Why does Alert still require cooling?

- The internal loads from CSA F280
  - Occupants: 70 W (240 BTUH) per person
  - Electrical loads: Minimum 800 W (2730 BTUH),

4 W/m<sup>2</sup> (1.27 BTUH/ft<sup>2</sup>) if > 200m<sup>2</sup> (2150 ft<sup>2</sup>)

- No credit for thermal mass of building
- Below grade elements do not get free cooling from soil temperature
- CSA F280 only allows for calculating peak loads



## WHEN COOLING IS REQUIRED

### CSA F280 will <u>always</u> output some cooling requirement

Cannot provide an answer on when cooling is <u>not</u> required

- Does not allow for passive cooling
  - Cannot open a window in the model





## **BSSB INFORMATION BULLETIN**

#### **Building and Safety Standards Branch**

No. B24-08

April 19, 2024

#### **Protection from Overheating in Dwelling Units**

- 5-Page Bulletin on the 26°C Refuge Room
- **Passive Cooling Strategies**
- **Energy Modelling Requirements** 
  - Use CSA F280, **not** HOT 2000 ٠
- **Allows for Passive Cooling Strategies** 
  - Refers to Sentence 2.2.2.1.(1) of Division C. •



#### Information Bulletin

**Building and Safety Standards Branch** (1) How Selida Satu Second Local Victoria BC VIW 912 Email building suffryinger to ca Website own could calculate

April 19, 2024

#### Protection from Overheating in Dwelling Units

This bulletin provides information about new provisions in the British Columbia Building Code (Building Code) 2024 related to minimizing the risks to health and safety due to overheating in dwelling units. These new Building Code 2024 requirements apply to projects for which a building permit is applied for on or after March 8, 2024. These changes apply to new dwelling units in all large (Part 3) and smaller (Part 9) residential occupancies.

#### Background

Recent extreme heat events in the summer of 2021 in British Columbia had devastating impacts, attributing to 619 deaths. Similar weather episodes are projected to become hotter, longer, and more frequent as 8.C.'s climate changes.

In the Report to the Chief Coroner of British Columbia, titled "Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021" a recommendation was made to "...ensure that the 2024 release of the BC Building Code incorporates both passive and active cooling requirements in new housing construction...\*

In response, the Building Code 2024 introduced a maximum design temperature limit for a single living space in each dwelling unit to minimize the risk to health and safety from overheating. Maintaining a safe temperature in a living space in each dwelling unit can involve a combination of mechanical cooling systems and passive design measures. The designated living space provides a place of reprieve for occupants of the dwelling unit from elevated temperatures, helping increase community resiliency and saving lives. The designer can designate a living space that makes sense for the circumstances of the dwelling unit (climate, configuration, building systems, etcetera), but it must be a living space that is designated. Unfinished basements, service rooms, and crawlspaces are not living spaces'.

In addition, designers must coordinate the specification of space-conditioning equipment (as necessary) with energy efficiency requirements of the BC Energy Step Code. In some cases, mechanical equipment such as heat necovery ventilators and heat pumps can be used to help maintain indoor design temperatures while also helping to meet energy efficiency targets.

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codesand-standards/bulletins/2024-code/b24-08\_overheating.pdf



## **BSSB INFORMATION BULLETIN**

#### **Protection from Overheating in Dwelling Units**

"Designers following Part 9 are required to provide sufficient information

to demonstrate that a minimum of one living space in each dwelling unit

meets the 26°C indoor design temperature requirement through passive

and/or active measures <u>as per CSA F280</u>."





## **BSSB INFORMATION BULLETIN**

#### **Division C: 2.2.2.1. General Information Required**

1) Sufficient information shall be provided to show that the proposed work will conform to this Code and whether or not it may affect adjacent property.

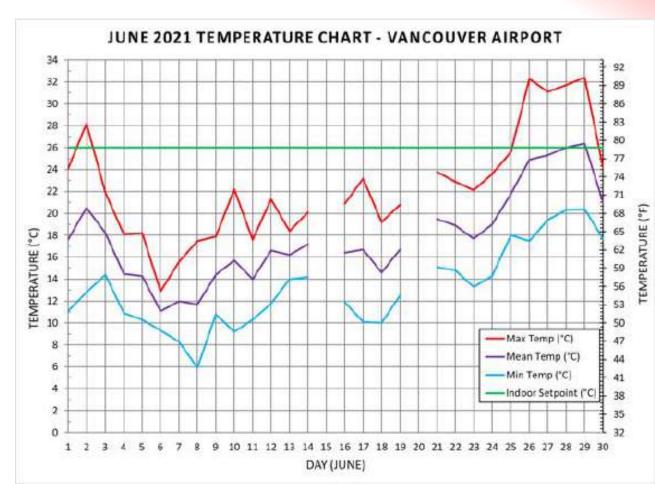
**Note:** CSA F280 was not designed to determine if cooling is required, only to provide a peak load



## **COOLING REQUIREMENTS**

### How do you prove cooling is not required?

- Simulation data must be provided
  - Weather data
  - Building thermal mass
  - Propagation of heat transfer
- Complex analysis!
- Engineer required?





## **REVIEWING A SINGLE ROOM**

### Errors in Modeling:

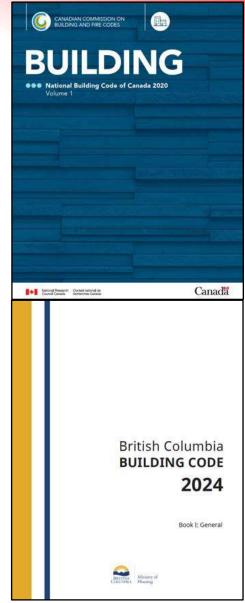
- Is the heat gain calculation performed on the <u>entire dwelling</u>, not just the living room?
  - Interior walls and floors will be assumed to have **no heat transfer** because they are modeled as conditioned spaces
- Have the **occupants** been included in the calculation?
- Have the *internal loads* been distributed to multiple rooms?
- Avoid these errors by following TECA & HVAC DC's guidelines!



## **COMMENTS ON FUTURE AMENDMENTS**

• CSA F280 is not designed to answer if cooling is required

- NBC is considering adopting cooling requirement
  - The NBC is considering whole house cooling
    - Rather than allowing a refuge room
  - Cut-off temperature for outdoor design temperatures below 26°C
- BCBC will likely modify the cooling clause in the future
- Single room cooling guidelines may be adopted in the BCBC





## HOME PERFORMANCE STAKEHOLDER COUNCIL

- **HPCN HVAC Registration Requires Training:**
- HLHG Certification
- Principals of Moving Air
- House as a System (HPSC)

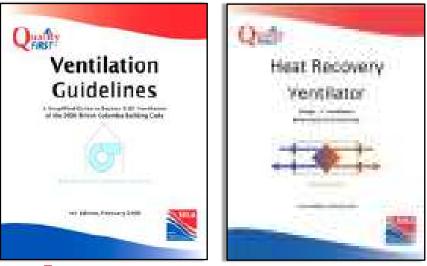


HPCN membership required for many rebates

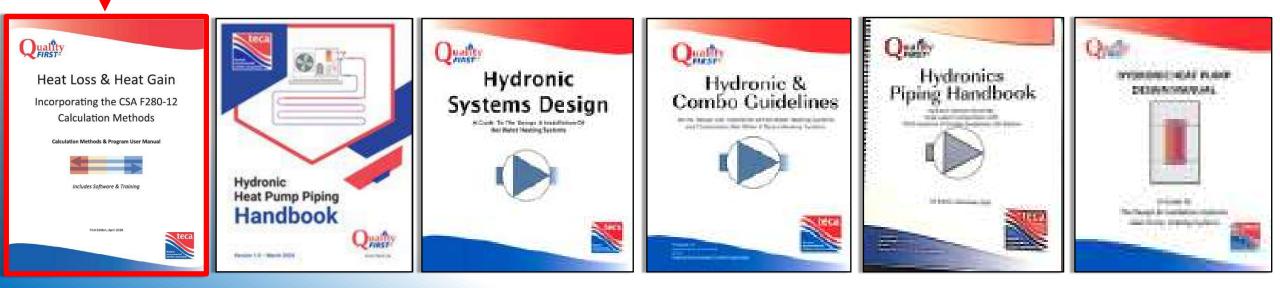
https://guides.co/g/updated-home-performance-contractor-network/231461



### **TECA COURSES**









### **QUESTIONS & COMMENTS?**

Todd Backus, P.Eng. Manager – Programs Development cell: 604.838.7511 email: tbackus@teca.ca



