Sunshine Coast Regional District
Building Division Policy

Heat Loss and Ventilation Checklists for all buildings.

February 1st, 2010

Subject: Requirements to provide ventilation check list, heat loss calculations, appliance selection, supply and return duct layout, hydronic loop layout, and/or electric heating layout for all buildings

Policy: With the increasing complexity of buildings and ever increasing Code requirements towards energy efficiency of buildings, it has become necessary to prove out design of heating systems for all buildings issued permits after March 1st 2010.

This policy will apply to all buildings for which permits are issued after April 1st 2010, but does not apply to the following structures:

- Garages and accessory buildings.
- Sheds and storage buildings
- Greenhouse structures on residentially zoned property.

Residential Contractors and Homeowner Builders will be required to supply a ventilation checklist and heat loss analysis/appliance selection and duct layout on or before the Framing Inspection to the Building Inspector.

Buildings of other than one and two family use will require a design by a Registered Professional.

Particulars of these checklists will change depending on the type of heat used, but typically in a forced air heating system a heat loss sheet, appliance selection sheet and duct layout will be required. ***(See package attached)***

All heat loss and ventilation requirements for buildings must follow either:

- the prescriptive requirements of the BCBC for Part Nine structures for heating and ventilation.
- a computer modeling approach acceptable to the Building Inspector to demonstrate alternative compliance , or,
- an ASHRAE 90.1 Energy Usage and Heat Loss analysis submitted by a Registered Professional.

Heat Load Worksheet
Square Foot Method

Date _____ Job # _____
Job address _____
_____
Completed by _____

STEP 1: Calculate **Dwelling Heat Load =**

_____sq.ft. (Total heated floor area) X _____ BTUH/sq. ft. (Dwelling Heat Load Factor) = _____BTUH **A**

STEP 2: If home has a heated crawlspace, calculate **Crawlspace Heat Load =**

_____sq.ft. (Total heated area of crawlspace) X _____ BTUH/ sq. ft. (Crawlspace Heat Load Factor) = _____BTUH **B**

STEP 3: **Base Heat Load @ 55°F DTD** (Box A + Box B = Box C) = _____BTUH **C**

STEP 4: Multiply Base Heat Load (Box C) by Regional Temperature Adjustment (RTA) factor from Design Temperature Chart. X _____ **D**

STEP 5: **Regionally Adjusted Base Heat Load** (Box C X Box D = Box E) = _____BTUH **E**

STEP 6: Add thermostat **Setback Pick-up factor of 10%.**

0.10 X _____BTUH in Box E = _____BTUH **F**

STEP 7: If Dwelling heated with hot-water appliance, skip STEP 8; proceed to STEP 9.

STEP 8: Add heat load due to outdoor air brought in for combustion (B149.1 & .2) with 4" Ø duct and directly connected to R.A. Plenum
Add 3000 BTUH times RTA factor (Box D) = 3000 BTUH X _____ = _____ BTUH **G**

STEP 9: Add Box E + F + G =
Total BTUH for Appliance Selection = _____ BTUH **H**

For use with Step 1

DWELLING HEAT LOAD FACTOR
Btuh/sq.ft. @ 55°F DTD

Dwelling Type—Duct location	ACH Rate		
	.5	.75	1
All HEATED areas including basement Ducts in conditioned space	14	16	18
All HEATED areas over heated crawl-space—Ducts in conditioned space	15	17	19
All HEATED areas slab-on-grade con-struction—Ducts in conditioned space	17	19	21
Ducts or piping in **unconditioned** space or in concrete slab	19	21	23

For use with Step 2

CRAWLSPACE HEAT LOAD FACTOR
Btuh/sq.ft. @ 55°F DTD

Crawlspace Height	ACH Rate		
	.5	.75	1
2'	5	6	7
3'	7	8	9
4'	8	9	10
5'	10	11	12

ACH Rates for standard, new constuction:
Use .5 ACH for dwelling in unexposed site. Use .75 ACH in moderately exposed site. Use 1 ACH in exposed site.

Example 1
Square Foot Method

See page 2-9 for Heat Loss calculation worksheet

Heating Appliance Selection Worksheet
Forced Air Heating Systems

Total Heated Floor Area of Dwelling = _____ Sq. Ft.

STEP 1: **Dwelling Heat Loss**
(From Box H, Square Foot Worksheet or Short Form Worksheet) = _____ BTUH **A**

STEP 2: Use manufacturer's specification tables to select an Appliance with a **BTUH Output** equivalent to Box A or next largest size.

Selected Appliance Heating Capacity: **Input** _____ UH **B**

[X] sea level [ ] high altitude **Output** _____ BTUH **C**

STEP 3: **Appliance Air Circulation:**

Heating Function only (no options) @ .3" W.C. External Static Pressure (ESP) _____ **D**

Evaporator Coil Installed Add .2" W.C. External Static Pressure (ESP) _____ **E**

High Efficiency Air Filter Installed Add .1" W.C. External Static Pressure (ESP) _____ **F**

Total System ESP (Box D + Box E + Box F) = _____ **G**

Motor Speed Selected _____ @ _____ESP (Box G) = **Heating** CFM _____ CFM **H**

Cooling Air Capacity @ 400 CFM/Ton

Tons	1.5	2.0	2.5	3.0	4.0	5.0
CFM	600	800	1000	1200	1600	2000

Nominal Tons of cooling capacity = _____ Tons

Motor Speed Selected _____ @ _____ESP (Box G) = **Cooling** CFM _____ CFM **I**

STEP 4: **RETRO-FIT only : Measured capacity of duct system** = _____ CFM **J**
Attach Retro-fit Worksheet

Box J must be ≥ to Box H

STEP 5: **Duct System designed to:** [ ] **Heating Only** or
[ ] **A/C Ready: Future A/C duct sized to** _____ **CFM @** _____ **ESP**

STEP 6: **Temperature Rise** = Furnace output divided by (heating CFM X 1.1).

(Box C) _____ BTUH
_____ = Temperature Rise = _____ °F **K**
(Box H) _____ CFM X 1.1

Temperature Rise Range
from manufacturer's Technical Specifications: _____ °F (Box K must fall within this range)

Sample

MANUFACTURER'S TECHNICAL SPECIFICATIONS

MODEL	A	B	C	D
GAS TYPE	NAT	NAT	NAT	NAT
INPUT (BTUH)	50,000	75,000	100,000	125,000
OUTPUT	**40,300**	**59,700**	**80,000**	**100,700**
RATED EXT. STATIC PRESS.	.10/0.5	.12/0.5	.15/0.5	.20/0.5
TEMPERATURE RISE	45-75	35-65	40-70	45-75
VOLTS/AMP	115/4.6	115/8.2	115/8.2	115/11.0
TRANSFORMER SIZE (VA)	40	40	40	40
ANTICIPATOR SETTING	.85	.85	.85	.85
LIMIT SETTING MAX	250	210	210	160
FAN SW SETTING: ON	125	125	125	125
OFF	100	100	100	100
GAS VALVE MFG/TYPE	MH/VR8204A	MH/VR8204A	MH/VR8204A	MH/VR8204A
REGULATION TYPE	SNAP	SNAP	SNAP	SNAP
MANIFOLD PRESSURE	3.5	3.5	3.5	3.5
ORIFICE SIZE	2/#42	3/#42	4/#42	5/#42
IGNITION TYPE	MH/S86F	MH/S86F	MH/S86F	MH/S86F
PILOT ORIFICE SIZE	.018	.018	.018	.018
SPARK GAP	1/8	1/8	1/8	1/8
PRESSURE SWITCH	0.65	0.70	0.44	0.70

NOTE— For elevations above 2,000 Feet: the ratings should be reduced by 4% for each 1000 feet above sea level. The furnace must not be derated; orifice changes should only be made if necessary for altitude.

Blower Performance Data

MODEL			A		B		C		D	
Blower Data Type & Size			DD 9-6A		DD 10-7A		DD 10-8A		DD 10-9A	
Motor Horse Power			1/6 PSC		1/2 PSC		1/2 PSC		3/4 PSC	
Air Delivery (CFM) at Various External Static Pressures (in. W.C.)	ESP	Speeds	L/S	CFM	L/S	CFM	L/S	CFM	L/S	CFM
	0.10	Low	–	–	410	870	420	890	490	1035
		Med. Low	300	640	545	1155	535	1130	650	1380
		Med. High	330	700	695	1470	675	1425	810	1720
		High	460	975	835	1765	830	1755	985	2090
	0.20	Low	–	–	420	890	430	910	495	1050
		Med. Low	310	655	545	1155	540	1140	645	1365
		Med. High	355	755	685	1450	670	1420	795	1685
		High	445	960	805	1705	815	1725	950	2015
	0.30	Low	–	–	430	910	435	920	500	1055
		Med. Low	310	660	545	1150	540	1140	635	1345
		Med. High	355	755	675	1425	665	1405	775	1645
		High	445	945	780	1650	795	1680	915	1935
	0.40	Low	–	–	435	920	440	930	500	1060
		Med. Low	310	660	540	1140	535	1135	630	1330
		Med. High	355	750	660	1395	655	1385	755	1595
		High	440	930	755	1600	765	1620	875	1850
	0.50	Low	–	–	440	930	440	930	495	1050
		Med. Low	305	650	530	1120	530	1120	615	1300
		Med. High	350	740	635	1350	635	1350	725	1540
		High	420	895	715	1520	735	1560	835	1770
	0.60	Low	–	–	435	920	435	925	485	1030
		Med. Low	300	635	520	1100	520	1105	590	1250
		Med. High	340	725	615	1300	625	1325	695	1475
		High	400	850	690	1465	705	1495	795	1680

Worksheet 1
Supply Air System Layout & Summary

JOB #:_____ Address_____
Date_____Completed by _____

Total Supply Air required = [ ] A Max. Supply Air delivered = [ ] B

Trunk Duct Adjustment:
Box A / Box B = _____ = [ ] C Multiply sub-totals for trunk sizing by Box C to adjust trunk duct sizes for actual cfm carried.

SKETCH
Show all trunks and branches.

floor level

Branch Duct Size	4"Ø			5"Ø			6"Ø		
Number of fittings per branch	3 ftg	5 ftg	7 ftg	3 ftg	5ftg	7ftg	3ftg	5ftg	7ftg
Max. CFM per branch	35	30	25	65	55	45	100	90	75
Sub-totals for Trunk Sizing									
= Box B	a	b	c	d	e	f	g	h	i

a+b+c+d+ e+f+g+h+i = _____ CFM B Box B≥ Box A

Trunk Duct Sizes

#1:	#4:
#2:	#5:
#3:	#6:

Worksheet 2
Return Air System Layout & Summary

JOB #:__________ Address______________________________

____

Date__________Completed by ______________________________

Show all trunks and branches.

SKETCH

Wall construction	2 x 4	2 x 6	2 x 4	2 x 6	2 x 4	2 x 6
Return Air Grille Size	14 x 6	14 x 8	24 x 6	24 x 8	30 x 6	30 x 8
Maximum CFM capacity	200	260	350	460	425	580

Supply Register Summary per RG

Sub-totals for Trunk Sizing

= Box B

a	b	c	d	e	f

a+b+c+d+e+f = ______ CFM **B**

Box B≥ Box A

Trunk Duct Sizes

#1:	#3:
#2:	#4:

Return Air Drop Size: