Commissioning Worksheets (Part A-General) (W 1)

Wallet card photocopy

Inspection Authority: _____
Signature: _____
Date: _____

Commissioner: _____
Phone: _____ Fax _____
Date: _____/

Submitted For: (Owner)
Name _____
Address _____
City _____ Prov _____
Postal Code_____
Phone: _____ Fax _____

By: (Contractor)
Name _____
Address _____
City _____ Prov _____
Postal Code _____
Phone: _____ Fax _____

A.1 Worksheets required

☐ W.1	Worksheet 1, Part A: General:	Required for all jobs
☐ W.2 a, b, c	Worksheet 2, Part B: Forced Air Heating:	For jobs with forced air heating systems
☐ W.3 a, b	Worksheet 3, Part C: Hot Water Heating:	For jobs with hot water heating systems
☐ W.4	Worksheet 4, Part D: Forced Air Cooling:	For jobs with forced air cooling systems
☐ W.5 a or b	Worksheet 5, Part E: Ventilation System:	Required for all jobs.
☐ W.6	Worksheet 6, Part F: Depressurization:	Required for most part 6 and F326 jobs.

A.2 Certification

I certify that the HVAC systems have been commissioned according to the requirements of the manufacturer's commissioning instructions, the worksheets checked below, and all applicable codes.

☐ W.1 ☐ W.2 a, b, c ☐ W.3 a, b ☐ W.4 ☐ W. 5 a or b ☐ W.6

HRAI Certification #:_____

Expiry Date: _____Signature: _____

Forms available from: HRAI * 2350 Matheson Blvd. East * Suite 101 * Mississauga, Ontario * L4W 5G9

(Aug. 17)

Commissioning (Part B-Forced Air Heating) (W 2a)

B.1 Heating unit (Designed)

make: _____

model: : _____

fuel type: ☐ng ☐lp ☐oil ☐ele ☐hp ☐w ☐other

output: _____ Btu/h

fan speed or RPM: _____

fan control settings: on _____ °F off _____°F

heat anticipator setting manufacturer _____A

B.2 Heating unit (Installed)

make: _____

model: : _____

fuel type: ☐ng ☐lp ☐oil ☐ele ☐hp ☐w ☐other

output: _____ Btu/h

fan speed or RPM: _____

fan control settings: on _____ °F off _____°F

heat anticipator setting _____A

B.3 Before start-up

- ☐ electrical polarity correct
- ☐ unit electrically grounded
- ☐ fuel lines connected and tested
- ☐ drain lines connected and trapped
- ☐ all shipping bracing (packaging) removed
- ☐ duct system complete
- ☐ registers and grills installed
- ☐ duct system dampers open
- ☐ filter install (clean)

B.4 At Start -Up

- ☐ Fuel pressure correct
- ☐ Limit switch(s) operation correct
- ☐ Unit venting properly
- ☐ Circulation fan rotation correct
- ☐ Refrigerant pressures and levels correct
- ☐ Combustion efficiency test

B.5 Temperature rise (Designed)

Designed: _____ °F (RASD **C.5**)

Manufacturers range: _____ °F to _____ °F

B.6 Temperature rise (Operating)

_____ °F **(**SA temp. – RA temp.)

☐ within manufacturers range

This work sheet has been designed to be generic in nature. Depending on the system being commissioned other information or procedures may be required to ensure the safe and efficient operation of the system. Always consult and follow the equipment manufacturers installation instructions.

Commissioning (Part B-Forced Air Heating) (W 2b)

B.7 External Static Pressure (Designed)

a) ESP: _____ in.W.C. (RASD **B.3**)

b) Filter PD: _____ in.W.C. (RASD **C.6**)

c) Coil PD: _____ in.W.C. (RASD **C.7**)

d) Total PD: _____ in.W.C. (RASD **C.8**)

Available press._____ in.W.C. (RASD **C.9**)

(a – d)

B.8 External Static Pressure (Operating)

a) supply SP _____ in. W.C (averaged)

b) return SP _____ in. W.C (averaged)

c) ESP _____ in. W.C. (a + b)

d) Filter press. drop_____ in. W.C. (averaged)

e) Coil press. drop _____ in. W.C. (averaged)

f) Total PD: _____ in.W.C. (d + e)

Available press. _____ in.W.C. (c – f)

B.9 System Air Flow (Temperature Rise method)

a) Heating output: _____ Btu/h(from **B.2)**

b) Operating temp. rise: _____°F (from **B.6)**

Estimated system air flow _____ CFM

a ÷ (b x 1.08) = CFM

B.10 System Air Flow (ESP method)

Operating ESP _____ in. W.C. (From **B.8 c**)

CFM @ closest ESP (from manufacture blower data)

_____ CFM @ _____ ESP

_____ CFM @ _____ ESP

Interpolated CFM at operating ESP

_____CFM

B.11 System Air Flow (velocity press. method)

a) Supply air velocity pressure _____ in.W.C.

or

b) Return air velocity pressure _____ in.W.C.

System CFM = $\frac{4005 \times \sqrt{VP \times area}}{144}$ = _____CFM

(area = duct cross sectional area in square inches)

B.12 Conversion Factor for Operating CFM

a) Design CFM _____ CFM (**RASD B.4**)

b) Operating CFM _____ CFM (**B.9**, **B.10** or **B.11**)

c) Conversion factor _____ (4 decimals)

(a ÷ b)

This work sheet has been designed to be generic in nature. Depending on the system being commissioned other information or procedures may be required to ensure the safe and efficient operation of the system. Always consult and follow the equipment manufacturer's installation instructions.

Commissioning (Part B-Forced Air Heating) (W 2c)								
B.13 Outlet Number	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**
B.14 Room Name								
B.15 Design CFM (RASD J.4)								
B.16 Correction Factor (B.12c)								
B.17 Corrected CFM (B.15 x B.16)								
B.18 Measured CFM								
B.19 Branch size								
B.20 Diffuser size								

B.13 Outlet Number	**S9**	**S10**	**S11**	**S12**	**S13**	**S14**	**S15**	**S16**
B.14 Room Name								
B.15 Design CFM (RASD J.4)								
B.16 Correction Factor (B.12c)								
B.17 Corrected CFM (B.15 x B.16)								
B.18 Measured CFM								
B.19 Branch size								
B.20 Diffuser size								

B.13 Outlet Number	**S17**	**S18**	**S19**	**S20**	**S21**	**S22**	**S23**	**S24**
B.14 Room Name								
B.15 Design CFM (RASD J.4)								
B.16 Correction Factor (B.12c)								
B.17 Corrected CFM (B.15 x B.16)								
B.18 Measured CFM								
B.19 Branch size								
B.20 Diffuser size								

PART B – FORCED AIR HEATING (return air flow verification):								
B.21 Inlet Number	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**
B.22 Room Name								
B.23 Design CFM (RASD H.4)								
B.24 Correction Factor (B.12c)								
B.25 Corrected CFM (B.23 x B.24)								
B.26 Measured CFM								
B.27 Grille size								

Commissioning (Part C-Hot Water Heating) (W 3a)

C.1 Heating unit (Designed)

make: _____

model: : _____

fuel type: ☐ng ☐lp ☐oil ☐ele ☐hp ☐w ☐other

output: _____ Btu/h

burner temp settings: on _____ °F off _____°F

circ. pump settings: on _____ °F off _____°F

heat anticipator setting manufacturer _____A

system design operating water pressure_____psi

C.2 Heating unit (Installed)

make: _____

model: : _____

fuel type: ☐ng ☐lp ☐oil ☐ele ☐hp ☐w ☐other

output: _____ Btu/h

burner temp settings: on _____ °F off _____°F

circ. pump settings: on _____ °F off _____°F

heat anticipator setting _____A

system operating water pressure_____psi

C.3 Before start-up

- ☐ electrical polarity correct
- ☐ unit electrically grounded
- ☐ fuel lines connected and tested
- ☐ drain lines connected and trapped
- ☐ all shipping bracing (packaging) removed
- ☐ expansion tank pressure correct
- ☐ water piping complete and tested
- ☐ all distribution system valves open
- ☐ water pressure regulator and relief valve set
- ☐ air purged from system
- ☐ drain (purge) hose connection capped

C.4 Operating in steady state condition

- ☐ fuel pressure correct
- ☐ limit switch(s) operation verified
- ☐ unit venting properly
- ☐ circulation pump rotation correct
- ☐ water pressures correct
- ☐ operating supply water temperature limit or minimum boiler temperature control set
- ☐ control system operating as designed
- ☐ system pressure when unit at high limit temperature is less than PRV setting

C.5 System Water Flow

(for use with Method B balancing only)

a) Design water flow (from design worksheet)

_____ USGPM

b) Reading from installed flow meter(s)

_____ USGPM

Note: b must be equal to or greater than **a**

This work sheet has been designed to be generic in nature. Depending on the system being commissioned other information or procedures may be required to ensure the safe and efficient operation of the system. Always consult and follow the equipment manufacturer's installation instructions.

Commissioning (Part C-Hot Water Heating) (W 3b)								
System balancing using temperature drop (method A)								
C.6 Zone or loop number	1	2	3	4	5	6	7	8
C.7 Room or area served								
C.8 Inlet water temperature								
C.9 Outlet water temperature								
C.10 Temperature drop (C.8-C.9)								

C.6 Zone or loop number	9	10	11	12	13	14	15	16
C.7 Room or area served								
C.8 Inlet water temperature								
C.9 Outlet water temperature								
C.10 Temperature drop (C.8-C.9)								

Commissioning (Part C-Hot Water Heating) (W 3b)								
System balancing using flow meter (method B)								
C.11 Zone or loop number	1	2	3	4	5	6	7	8
C.12 Room or area served								
C.13 Designed flow rate								
C.14 Measured flow rate								

C.11 Zone or loop number	9	10	11	12	13	14	15	16
C.12 Room or area served								
C.13 Designed flow rate								
C.14 Measured flow rate								

Commissioning (Part D-Forced Air Cooling) (W 4)

D.1 Cooling unit (Designed)

make: _____

model: : _____

output: _____ Btu/h

fan speed or RPM: _____

D.2 Cooling unit (Installed)

make: _____

model: : _____

output: _____ Btu/h

fan speed or RPM: _____

D.3 External Static Pressure (Designed)

a) ESP: _____ in.W.C. (RASD **B.3**)

D.4 External static pressure (Operating)

a) supply SP _____. in. W.C

b) return SP _____ in. W.C

c) ESP (a + b) _____ in. W.C.

D.5 System air flow (ESP method)

Operating ESP _____ in. W.C. (From **D.4 c**)

CFM @ closest ESP (from manufacture blower data)

_____ CFM @ _____ ESP

_____ CFM @ _____ ESP

Interpolated CFM at operating ESP _____CFM

D.6 System air flow (velocity press. method)

a) Supply Air Velocity pressure _____ in.W.C.

or

b) Return Air Velocity pressure _____ in.W.C.

System CFM = $\frac{4005 \times \sqrt{VP} \times \text{area}}{144}$ = _____CFM

D.7 Airflow acceptability

a) manufacturer minimum CFM/ton _____CFM

b) tons of cooling (output ÷ 12,000) _____ tons

c) minimum CFM (a x b) _____ CFM

d) Operating CFM _____ CFM (**D.5** or**D.6**)

☐ **d** equal to or greater than **c**

This work sheet has been designed to be generic in nature. Depending on the system being commissioned other information or procedures may be required to ensure the safe and efficient operation of the system. Always consult and follow the equipment manufacturer's installation instructions.

Commissioning (Part E - BC/BC 9.32 Ventilation System) (W 5a)

E.1 Principal Fan(s) (Designed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	_____	☐

or

❑ NAFFVA (draft diverter) and 4" return intake

Designed to: BCBC 9.32 /98 ☐

E.2 Principal Fan(s) (Installed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	_____	☐

(with any NAFFVA max. air flow 110 CFM)

or

❑ NAFFVA (draft diverter) and 4" return intake

Installed to: BCBC 9.32 /98 ☐

E.3 Kitchen/Bath Fans (Designed)

#	Make/Model	Location	CFM	Sones	HVI
_2_	_____	_____	_____	_____	☐
_3_	_____	_____	_____	_____	☐
_4_	_____	_____	_____	_____	☐

E.4 Kitchen/Bath Fans (Installed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	_____	☐
_3_	_____	_____	_____	_____	☐
_4_	_____	_____	_____	_____	☐

E.5 Make-up Air (designed)

Passive duct size _____ in. diameter

or

4" duct to return ☐ motorized damper ☐

or

Powered Make-up Air

#	Make/Model	Location	CFM	HVI
___	_____	_____	_____	☐
___	_____	_____	_____	☐

E.6 Make-up Air (designed)

Passive duct size _____ in. diameter

or

4" duct to return ☐ motorized damper ☐

or

Powered Make-up Air

#	Make/Model	Location	CFM	HVI
___	_____	_____	_____	☐
___	_____	_____	_____	☐

E7. Distribution System Balancing for multi-branch systems (Supply / Exhaust)

Supply	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
Room or area									
Design air flow									
Measured flow									

Exhaust	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**
Room or area									
Design air flow									
Measured flow									

Commissioning (Part E-NBC/OBC 9.32 Ventilation System) (W 5a)

E.1 Principal Fan(s) (Designed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	____	☐

HRV/ERV sensible recovery efficiency @ -13 °F / 64+ CFM _____%

Designed to: NBC 9.32 /95 ☐ OBC 9.32 /97 ☐

E.2 Principal Fan(s) (Installed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	____	☐

HRV/ERV sensible recovery efficiency @ -13 °F / 64+ CFM _____%

Installed to: NBC 9.32 /95 ☐ OBC 9.32 /97 ☐

E.3 Supplemental Fans (Designed)

#	Make/Model	Location	CFM	Sones	HVI
_2_	_____	_____	_____	_____	☐
_3_	_____	_____	_____	_____	☐
_4_	_____	_____	_____	_____	☐

HRV/ERV sensible recovery efficiency @ -13 °F / 64+ CFM _____%

E.4 Supplemental Fans (Installed)

#	Make/Model	Location	CFM	Sones	HVI
_2_	_____	_____	_____	_____	☐
_3_	_____	_____	_____	_____	☐
_4_	_____	_____	_____	_____	☐

HRV/ERV sensible recovery efficiency @ -13 °F / 64+ CFM _____%

E.5 Principal Fan(s) Air Flow (Designed)

a) Total Ventilation Capacity _____CFM

b) Minimum Principal Fan Air Flow _____CFM

c) Maximum Principal Fan Air Flow _____CFM

d) Designed Air Flow _____CFM

E.6 Principal Fan(s) Air Flow (Installed)

High speed low speed

Installed Air Flow _____ CFM _____CFM

☐ low speed / single speed installed air flow is between minimum & maximum principal fan air flows (E5 b, E5 c)

E.7 Supplemental Fan(s) Air Flow (Designed)

a) Total Ventilation Capacity (E5a) _____CFM

b) Principal Fan(s) air flow high (E6) _____CFM

c) Minimum Supplemental Air Flow _____CFM

E.8 Supplemental Fan(s) Air Flow (Installed)

Fan _2_ air flow (high speed) _____ CFM

Fan _3_ air flow (high speed) _____ CFM

Fan _4_ air flow (high speed) _____ CFM

❑ Total Installed Air Flow is = or >E7 c

E9. Distribution System Balancing for multi-branch systems (Supply / Exhaust)

Supply	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
Room or area									
Design air flow									
Measured flow									

Exhaust	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**
Room or area									
Design air flow									
Measured flow									

Commissioning (Part E-CSA F326 Ventilation System) (W 5b)

E.1 Fans/HRV/ERV (Designed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	_____	☐
_2_	_____	_____	_____	_____	☐
_3_	_____	_____	_____	_____	☐
_4_	_____	_____	_____	_____	☐

sensible efficiency @ 32 °F _____% _____watts
@ -13 °F _____% _____watts

System designed to: ☐ NBC-6/95 ☐ OBC-6/97 ☐ CSA F326 /91 ☐ BCBC-6/98

E.2 Fans/HRV/ERV (Installed)

#	Make/Model	Location	CFM	Sones	HVI
_1_	_____	_____	_____	_____	☐
_2_	_____	_____	_____	_____	☐
_3_	_____	_____	_____	_____	☐
_4_	_____	_____	_____	_____	☐

sensible efficiency @ 32 °F _____% _____watts
@ -13 °F _____% _____watts

System installed to: ☐ NBC-6/95 ☐ OBC-6/9 ☐ CSA F326 /91 ☐ BCBC-6/98

E.3 Ventilation Air Flow (Designed)

a) Total Ventilation Capacity _____ CFM
(from Res. Mech. Ventilation Record)

b) Designed Air Flow HRV/ERV _____CFM
Fan # ___ _____CFM
Fan # ___ _____CFM
Fan # ___ _____CFM

c) **Total Ventilation Air Flow _____CFM**

E.4 Ventilation Air Flow (Installed)

	High speed	low speed
HRV/ERV(balanced)	_____ CFM	_____CFM
Fan # ___	_____ CFM	_____CFM
Fan # ___	_____ CFM	_____CFM
Fan # ___	_____ CFM	_____CFM

☐ Maximum air flow meets or exceeds TVC

☐ Low(er) speed is 40% - 60% of TVC

E5. Distribution System Balancing for multi-branch systems (Supply / Exhaust)

Supply	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
Room or area									
Design air flow									
Measured flow									

Exhaust	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**
Room or area									
Design air flow									
Measured flow									

Commissioning (Part F-Depressurization) (W 6)

F.1 Combustion equipment:
(List combustion equip. & depressurization limits)

1. _____
   depressurization limit _____Pa
2. _____
   depressurization limit _____Pa
3. _____
   depressurization limit _____Pa
4. _____
   depressurization limit _____Pa
5. _____
   depressurization limit _____Pa

F.2 Exhaust equipment
(List all exhaust equipment and relevant data)

1. _____
   CFM: _____on at TVCC ☐ on at CEC☐
2. _____
   CFM: _____on at TVCC ☐ on at CEC☐
3. _____
   CFM: _____on at TVCC ☐ on at CEC☐
4. _____
   CFM: _____on at TVCC ☐ on at CEC☐
5. _____
   CFM: _____on at TVCC ☐ on at CEC☐

F.3 Depressurization test instrument

Make: _____

Model: _____

Test must be performed using an instrument capable of measuring 0 to 60 Pa with a sensitivity of 2 Pa.

F.4 Depressurization test conditions

Date of test: _____mm/dd/yy

Test to be carried out at time of Final Inspection or when house substantially complete.

Wind Condition _____ km/hr
(maximum wind of 12 km/hr (9 mph)

F.5 House depressurization measurements

a) Starting (rest) pressure _____ Pa

b) Pressure at TVCC _____ Pa

c) Pressure at CEC _____ Pa

d) Ending (rest) pressure _____ Pa

Depressurization at TVCC _____ Pa
(greater of (b - a) or (b - d))

Depressurization at CEC _____ Pa
(greater of (c - a) or (c - d))

☐ **System conforms to CSA F326 M91**

Exhaust / Make-Up Fan Air Flows

F.6 Fan	HRV	Dryer					
F.7 Room or area							
F.8 Design exhaust							
F.8 Design make-up							
F.10 Measured exhaust							
F.11 Measured make-up							

Pa	1	2	3	4	5	10	25	50	75	100	150
In. W.C.	.004	.008	.012	.016	.02	.04	.1	.2	.3	.4	.6