

FAN POWER CONSUMPTION



CERTIFICATE OF COMPLIANCE		NRCC-MCH-07-E
Power Consumption of Fans Requirements		(Page 1 of 2)
Project Name:	Date Prepared:	

A. Constant Volume Fan Systems

NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Constant Volume Fan Systems when using the Prescriptive Approach. See Power Consumption of fans §140.4(c).

<u>01</u>	<u>02</u>	<u>03</u>		<u>04</u>	<u>05</u>
FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS $A02 \times A04 \times 746 / (A03a \times A03b)$
		MOTOR	DRIVE		

B. Variable Air Volume Fan Systems

NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Variable Air Volume (VAV) Systems when using the Prescriptive Approach. See Power Consumption of fans §140.4(c).

<u>01</u>	<u>02</u>	<u>03</u>		<u>04</u>	<u>05</u>
FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS $B02 \times B04 \times 746 / (B03a \times B03b)$
		MOTOR	DRIVE		

C. Totals and Adjustments

FILTER PRESSURE ADJUSTMENT Equation 140.4-A in §140.4(c) of the Building Energy Efficiency Standards. A) If filter pressure drop (SP _a) is greater than 1 inch W. C. or 245 Pascal then enter SP _a on line 4. Enter Total Fan pressure drop across the fan (SP _f) on Line 5. B) Calculate Fan Adjustment and enter on line 6. C) Calculate Adjusted Fan Power Index and enter on Row 7	<u>01</u>	TOTAL FAN SYSTEM POWER (WATTS, SUM COLUMN F)		W
	<u>02</u>	SUPPLY DESIGN AIRFLOW		CFM
	<u>03</u>	TOTAL FAN SYSTEM POWER INDEX (Row 1 / Row 2) ¹		W/CFM
	<u>04</u>	SP _a		in W.C or Pa
	<u>05</u>	SP _f		in W.C or Pa
	<u>06</u>	Fan Adjustment = $1 - (SP_a - 1) / SP_f$		
	<u>07</u>	ADJUSTED FAN POWER INDEX (Line 3 x Line 6) ¹		W/CFM

1. TOTAL FAN SYSTEM POWER INDEX or ADJUSTED FAN POWER INDEX must not exceed 0.8 W/cfm for Constant Volume systems or 1.25 W/cfm for VAV systems.

FAN POWER CONSUMPTIONCEC-NRCC-MCH-07-E (Revised MM/YY)

CERTIFICATE OF COMPLIANCE		NRCC-MCH-07-E
Power Consumption of Fans Requirements		(Page 2 of 2)
Project Name:	Date Prepared:	

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
Company:	Signature Date:
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RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

- The information provided on this Certificate of Compliance is true and correct.
- I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
- The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
- The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
- I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
Company :	Date Signed:
Address:	License:
City/State/Zip:	Phone:

NRCC-MCH-07-E User Instructions

This form is used to document the calculations used in sizing equipment and demonstrating compliance with the fan power requirements when using the prescriptive approach. The PROJECT NAME and DATE should be entered at the top of the form. See §140.4(c).

Note: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp for Constant Volume Fan Systems or Variable Air Volume (VAV) Systems when using the Prescriptive Approach.

This section is used to show how the fans associated with the space-conditioning system complies with the maximum fan power requirements. All supply, return, exhaust, and space exhaust fans – such as toilet exhausts – in the space-conditioning system that operate during the peak design period must be listed. Included are supply/return/exhaust fans in packaged equipment. Economizer relief fans that do not operate at peak are excluded. Also excluded are all fans that are manually switched and all fans that are not directly associated with moving conditioned air to/from the space-conditioning system, such as condenser fans and cooling tower fans.

If the total horsepower of all fans in the system is less than 25 hp, then this should be noted in the FAN DESCRIPTION column and the rest of this section left blank. If the total system horsepower is not obvious, such as when a VAV System has many fan-powered boxes, then this section must be completed.

Note: VAV fans and Constant Volume fans should be summarized on separate forms.

Sections A. Constant Volume Fan Systems & Section B. Variable Air Volume Fan Systems

1. FAN DESCRIPTION lists the equipment tag or other name associated with each fan.
2. DESIGN BRAKE HORSEPOWER lists the brake horsepower, excluding drive losses, as determined from manufacturer's data.

For dual-fan, dual-duct systems, the heating fan horsepower may be the (reduced) horsepower at the time of the cooling peak. If unknown, it may be assumed to be 35% of design. If this fan will be shut down during the cooling peak, enter 0 in COLUMN 02. If the system has fan-powered VAV boxes, the VAV box power must be included if these fans run during the cooling peak (i.e. series style boxes). The power of all boxes may be summed and listed on a single line. If the manufacturer lists power consumption in watts, then the wattage sum may be entered directly in COLUMN 05. Horsepower must still be entered in COLUMN 02 if the designer intends to show that total system has less than 25 hp.

3. EFFICIENCY lists the efficiency of the MOTOR and DRIVE. The default for a direct drive is 1.0; belt drive is 0.97. If a variable-speed or variable-frequency drive is used, the drive efficiency should be multiplied by that device's efficiency.
4. NUMBER OF FANS lists the number of identical fans included in this line.
5. PEAK WATTS is calculated as:

$$\frac{((\text{BHP} \times \text{Number of Fans} \times 746 \text{ W/HP}) / (\text{Motor Efficiency, } E_m \times \text{Drive Efficiency, } E_d))}{\text{Number of Fans}}$$
where BHP (COLUMN 02) is the design brake horsepower as described above, E_m (COLUMN 03a) and E_d (COLUMN 03b) are the efficiency of the motor and the drive, respectively.

Section C. Totals and Adjustments

1. TOTALS FANS SYSTEMS POWER is the sum of all PEAK WATTS from (COLUMN 06). Enter sum in provided box at the right.
2. SUPPLY DESIGN AIRFLOW (CFM) Enter sum in provided box at the right (under COLUMN 06) to identify the design airflow of the system.
3. TOTAL FAN SYSTEM POWER INDEX, W/CFM is calculated by dividing the total PEAK WATTS (COLUMN F) by the total CFM. To comply, total space-conditioning system power demands must not exceed 0.8 W/CFM for constant volume systems, or 1.25 W/CFM for VAV systems. See §140.4(c)

If filter pressure drop is greater than 1 inch W. C. Enter filter air pressure drop. SP_a on line 4 and total pressure drop across the fan SP_f on Line 5, otherwise leave blank and go to Line 7. See §140.4(c)3.

4. SP_a is the air pressure drop across the air treatment or filtering system.
5. SP_f is the total pressure drop across the fan.
6. FAN ADJUSTMENT is the adjusted fan power index = $1 - (SP_a - 1) / SP_f$.

7. ADJUSTED FAN POWER INDEX is the total fan systems power index multiplied with the fan adjustment (Line 3 x Line 6).

Note: TOTAL FAN SYSTEM POWER INDEX or ADJUSTED FAN POWER INDEX must not exceed 0.8 W/CFM, for Constant Volume systems or 1.25 W/CFM for VAV systems).