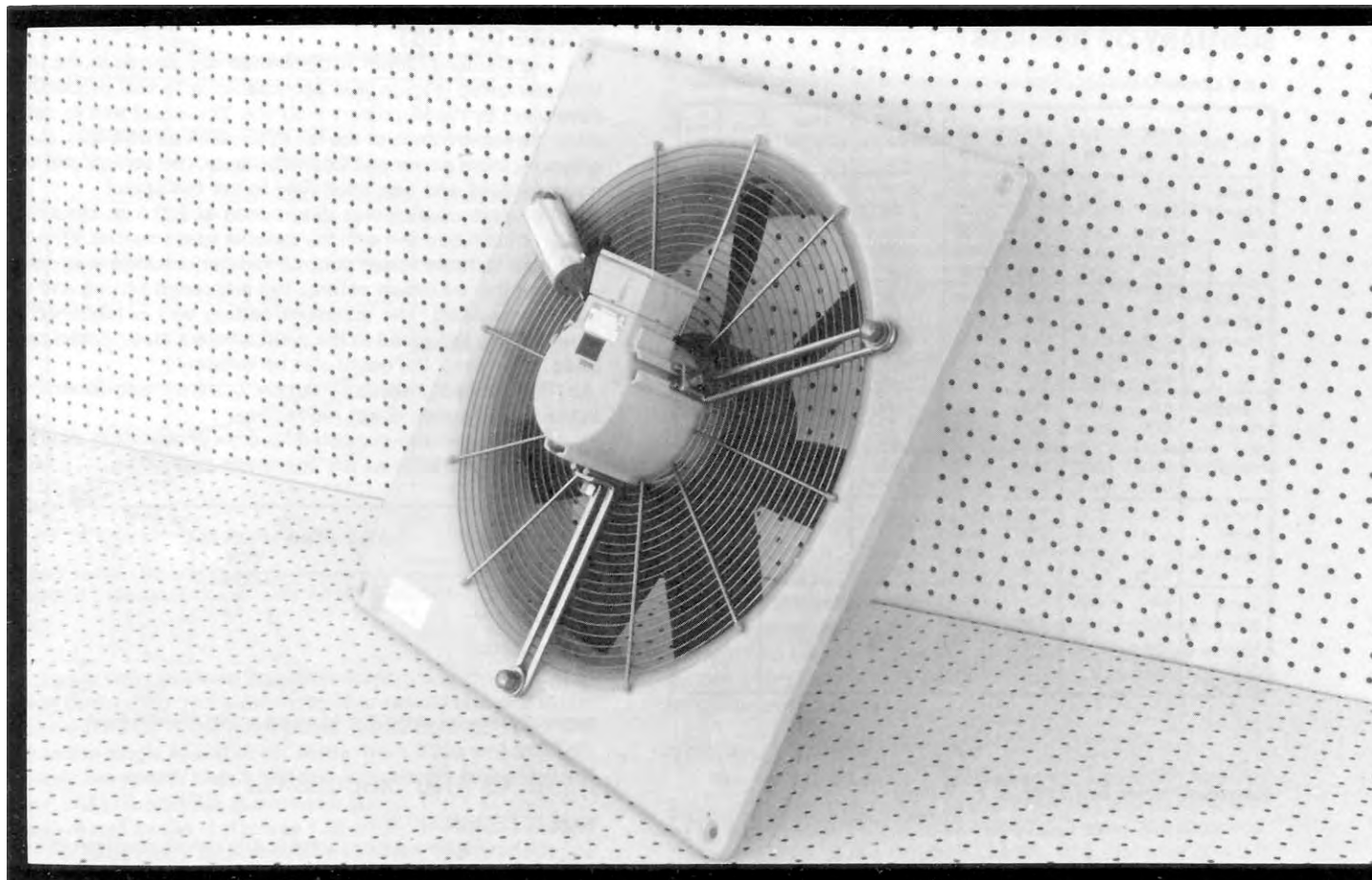


Evaluation Report

465



Siemens Model 2CC2-506 Ventilation Fan

A Co-operative Program Between



Air flow rates at typical levels of operation (i.e. static pressure) are given in TABLE 1. Ventilation fans are often rated on their output at a static pressure of 0.125 in wg (31.1 Pa). The manufacturer's rated air flow rate at 0.125 in wg (31.1 Pa), in the single speed direct mode, was 3396 cfm (1603 L/s). PAMI's measured flow rate at the same conditions was 3590 cfm (1700 L/s) or 6% greater than the manufacturer's rating.

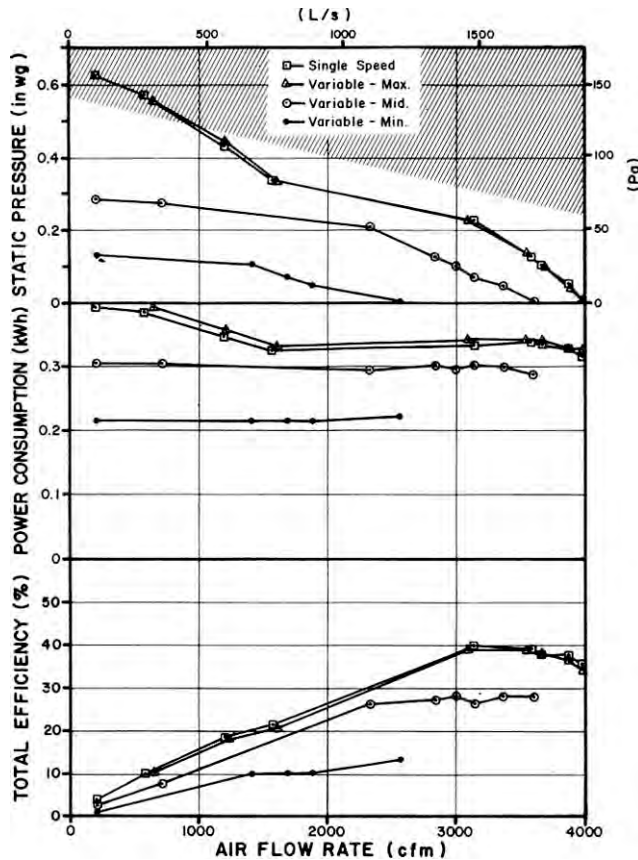


FIGURE 3. Siemens Model 2CC2-506 Fan Performance Curves in the Single Speed Mode and at Three Speed Settings in the Variable Speed Mode.

Power Consumption: Power consumption is the amount of energy (kWh) used by the fan motor. For typical levels of static pressure (TABLE 1), the input power varied from 0.315 to 0.339 kWh in the single speed direct mode, from 0.326 to 0.340 kWh at maximum speed, from 0.289 to 0.302 kWh at mid range and from 0.083 to 0.222 kWh at minimum speed. The maximum amperage drawn by the motor was 1.60 amps, which was greater than the rated motor amperage of 1.45 amps. The shaded zone in FIGURE 3 illustrates operating levels where the rated motor amperage was exceeded. Prolonged operation in excess of the rated amperage could reduce motor life.

Total Efficiency: Total efficiency is the ratio of air horsepower over the input power. Air horsepower is dependent upon the air flow rate and corresponding total pressure. For typical levels of operation, the total efficiency (TABLE 1), using the variable speed control, ranged from 34 to 39% at maximum speed, 17 to 28% at mid range and 5 to 14% at minimum speed. The total efficiency in the single speed direct mode at a static pressure of 0.125 in wg (31.1 Pa) was 39%.

Effect of Louvres: The optional louvres were installed on the outlet side of the fan to determine their effect on fan output. The fan was tested under these conditions in the single speed direct mode only. Using the louvres reduced the air flow rate by 10 to 40% (FIGURE 4) over the typical range of operation. For example, at a static pressure of 0.125 in wg (31.1 Pa), the louvres reduced the air flow rate by 16%, from 3590 cfm (1700 L/s) to 3020 cfm (1430 L/s) (TABLE 1). The efficiency was in turn

reduced from 39 to 26%. The use of other control devices such as shutters, dampers, screens, and hoods would also reduce air flow rates by varying amounts. The use of such control devices have to be taken into consideration when designing a ventilation system.

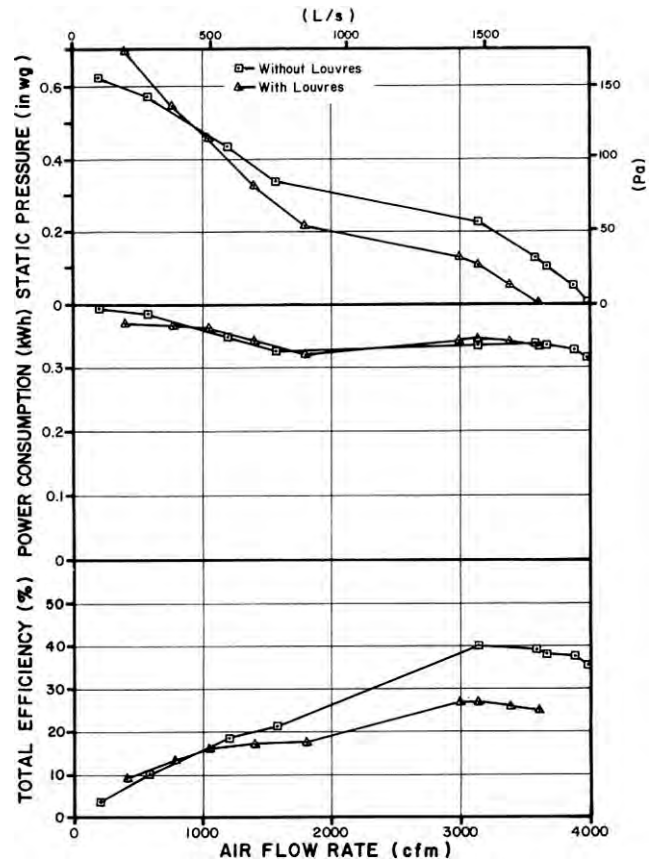


FIGURE 4. Effect of Louvres on Fan Performance.

EASE OF OPERATION

Maintenance: The inlet guard grill, motor mount and motor could all be easily removed for cleaning. Regularly scheduled cleaning and maintenance will ensure longer motor life and optimum performance.

OPERATOR SAFETY

The inlet guard grill provided adequate protection from the fan blades. The motor was a totally enclosed unit and presented no safety hazards. The Model 2CC2-506 was CSA approved. The noise level of the Model 2CC2-506, at a distance of 4.9 ft (1.5 m) from the centre of the fan discharge, while operating at a 0.125 in wg (31.1 Pa) static pressure, was 73 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Model 2CC2-506 falls within range 3 of the PAMI noise level range classification (APPENDIX II). The noise level produced by this fan can be considered annoying and be detrimental to hearing and operator performance under continuous exposure. Ear protection should be considered if working near the fan for prolonged periods.

OPERATOR'S MANUAL

The operating instructions contained information on general operation, installation, maintenance, and safety. Fan performance data was given in a separate brochure.

APPENDIX I

SPECIFICATIONS

MAKE: Siemens

MODEL: 2CC2-506

MANUFACTURER: Siemens Electric Limited
9829, 45 Avenue
Edmonton, Alberta
T6E 5C8

OVERALL DIMENSIONS:

- housing width 25.75 in (654 mm)
- housing height 25.75 in (654 mm)
- housing depth (motor included) 9.25 in (235 mm)
- housing diameter 19.50 in (495 mm)
- guard grill diameter 22 in (559 mm)
- grill opening 0.063 in (2 mm) diameter wire spaced at 0.313 in (8 mm) in a circular pattern

IMPELLERS:

- diameter 19.1 in (486 mm)
- hub diameter 7.1 in (179 mm)
- number of blades 7
- blade angle variable - 28° at the tip, 43° at the hub

WEIGHT: 40 lb (18 kg)

MOTOR NAMEPLATE DATA:

make	Siemens
model	2CC2-506
rpm	1070
volts	240 V
amps	1.45 A
phase	1
cycles	60 Hz
horsepower	0.268 hp (200 W)

APPENDIX III

CONVERSION TABLE

cubic feet/minute (cfm) x 0.472	= litres/second (L/s)
horsepower (hp) x 745.7	= watts (W)
inches (in) x 25.4	= millimetres (mm)
inches water gauge (in wg) x 249.1	= pascals (Pa)
pounds (lb) x 0.45	= kilograms (kg)

**SUMMARY CHART
SIEMENS MODEL 2CC2.506
VENTILATION FAN**

RETAIL PRICE: \$274.00
(January, 1986, f.o.b. Lethbridge)

FAN DESCRIPTION: 19.5 in (495 mm) propeller fan, variable speed, direct drive, 0.268 hp (200 W) 240 V electric motor.

FAN SPEED:

- single speed direct 1087 to 1105 rpm
- variable speed 554 to 1097 rpm

EFFICIENCY RANGE:

- without louvres 5 to 39%
- with louvres 17 to 26%

EFFICIENCY AT 0.125 in wg (31.1 Pa):

- without louvres 39%
- with louvres 26%

AIR FLOW RATE:

- range 670 to 4010 cfm (316 to 1890 L/s)
- at 0.125 in wg (31.1 Pa) 3590 cfm (1700 L/s) single speed without louvres and 3020 cfm (1430 L/s) with louvres

POWER CONSUMPTION: 0.083 to 0.347 kWh

OPERATOR SAFETY: inlet guard provided
CSA approved
noise level -- 73 dB(A) at 4.9 ft (1.5 m) from fan discharge

OPERATOR'S MANUAL: adequate

APPENDIX II

NOISE LEVEL RANGES

RANGE	SOUND LEVEL (dBA)	COMMENTS
1	up to 45	Tolerable, low level background noise.
2	45 to 60	Dominating background noise that would interfere with normal conversation.
3	60 to 85	Could be annoying and be detrimental to hearing and operator performance under long-term continuous exposure. Ear protection should be considered.
4	over 85	Could damage hearing, depending on level and exposure time. Ear protection is definitely recommended.



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