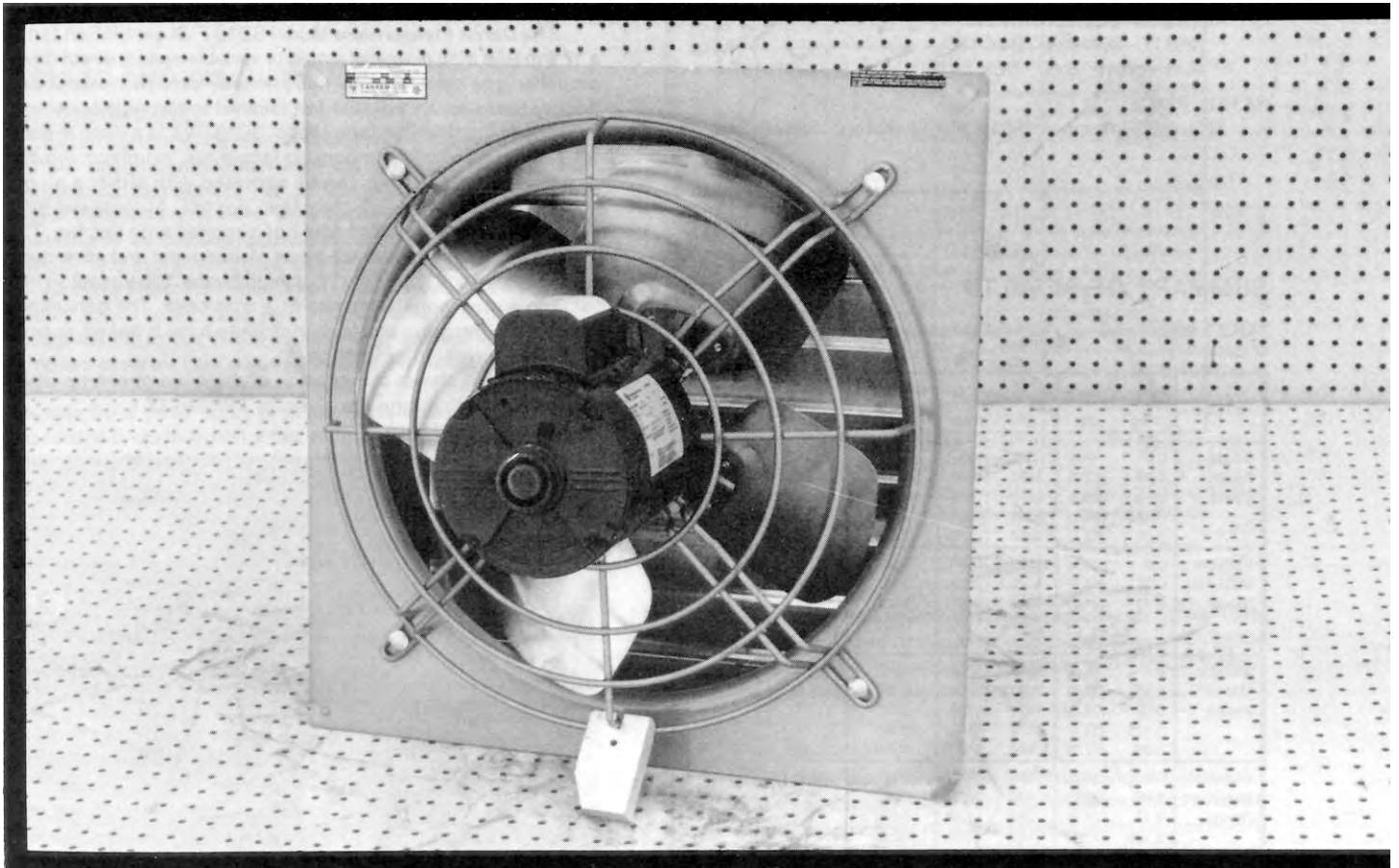


Evaluation Report

450



Danor Pleasantaire Model SD18-FVX Ventilation Fan

A Co-operative Program Between



ALBERTA
FARM
MACHINERY
RESEARCH
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

DANOR PLEASANTAIRE MODEL SD18-FVX VENTILATION FAN

MANUFACTURER:

Canarm Limited
2157 Parkedale Avenue
Brockville, Ontario
K6V 5V6

DISTRIBUTORS:

1. Peavey Mart
2420 - 50 Avenue
Red Deer, Alberta T4R 1M3
2. Federated Cooperatives Ltd.
Box 1050, 401 - 22nd St. E.
Saskatoon, Saskatchewan S7K 3M9
3. Steinbach Mills
P.O. Box 1089
Steinbach, Manitoba R0A 2A0
4. Peacock Equipment Ltd.
26311 - 30A Ave., Box 190
Aldergrove, B.C. V0X 1A0

RETAIL PRICE:

\$239.00 (September, 1985, f.o.b. Saskatoon, Saskatchewan).

SUMMARY OF RESULTS

TABLE 1. Danor Pleasantaire Model SD18-FVX Fan Performance at Typical Levels of Operation.

SETTING	STATIC PRESSURE		AIR FLOW RATE		POWER CONSUMPTION kWh	TOTAL EFFICIENCY %	FAN SPEED rpm
	in wg	(Pa)	cfm	(L/s)			
Single Speed Direct	0.0	(0.0)	3520	(1660)	0.376	25	1139
	0.05	(12.5)	3380	(1600)	0.385	27	1135
	0.10	(24.9)	3220	(1520)	0.391	28	1134
	0.125	(31.1)	3140	(1480)	0.393	28	1132
	0.25	(62.3)	2700	(1270)	0.410	30	1127
Variable Maximum Range	0.0	(0.0)	3390	(1600)	0.388	22	1103
	0.05	(12.5)	3270	(1540)	0.397	24	1094
	0.10	(24.9)	3080	(1460)	0.402	25	1089
	0.125	(31.1)	2980	(1410)	0.405	25	1087
	0.25	(62.3)	2390	(1130)	0.435	23	1072
Variable Mid Range	0.0	(0.0)	2550	(1200)	0.368	9	825
	0.05	(12.5)	2040	(962)	0.376	8	766
	0.10	(24.9)	1570	(739)	0.383	7	734
	0.125	(31.1)	1370	(649)	0.385	7	725
	0.25	(62.3)	904	(427)	0.380	7	717
Variable Minimum Range	0.0	(0.0)	926	(437)	0.265	1	435
	0.05	(12.5)	570	(269)	0.262	1	424
	0.10	(24.9)	282	(133)	0.250	1	422
	0.125	(31.1)	177	(84)	0.249	1	424

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying a detailed operator's manual containing illustrations and information on general operation and installation, maintenance, rated performance, safety aspects and trouble shooting.

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Due to high quality fabrication, this piece of equipment is maintenance free. Because of instream air cooled design, our motor has long life at Very low noise levels. The only care that must be given our fan is to keep it clean. In case of motor failure, the owner should contact the nearest service depot as outlined in the warranty card provided with each unit. Installation framing dimensions and power requirements are supplied on all sales literature. Detailed wiring and hook-up instructions are packed with every fan and control.

GENERAL DESCRIPTION

The Danor Pleasantaire Model SD18-FVX ventilation fan is a 17.9 in (456 mm) diameter single or variable speed, direct drive, propeller type axial flow fan. It is primarily used in livestock and poultry barns as an exhaust fan located in the wall or ceiling.

The Danor Pleasantaire Model SD18-FVX is a flush mounted unit equipped with a mounting face plate, aluminum louvres and thermostat. The fan can be operated with either a single speed, two speed or variable speed control. An optional inlet guard grill is available but was not supplied with the fan. The 4 blade propeller and hub are made of aluminum and are mounted directly on a 0.33 hp (249 W), single phase, 230 V electric motor. The motor mount consists of a wire cage. The galvanized sheet metal housing and motor mounts have a baked enamel finish for corrosion protection.

FIGURE 1 shows the location of major components while detailed specifications are given in APPENDIX I.

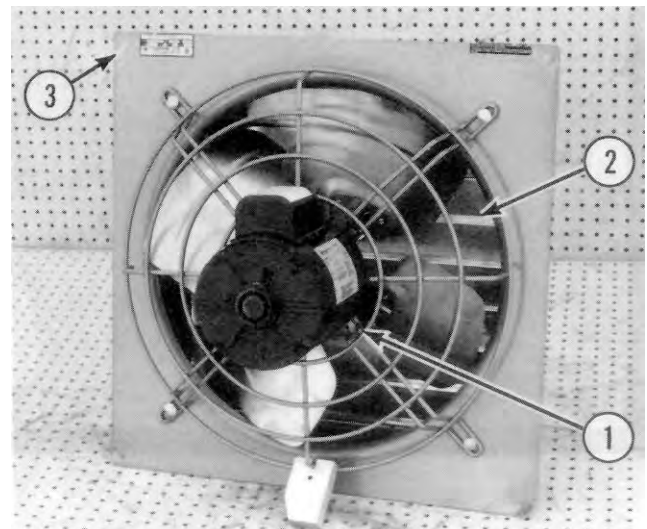


FIGURE 1. Danor Pleasantaire Model SD18-FVX Ventilation Fan: (1) Motor Mount, (2) Louvres, (3) Mounting Face Plate.

SCOPE OF TEST

The Danor Pleasantaire Model SD18-FVX fan was tested in the inlet chamber setup (Figure 2) in accordance with test procedures developed by the Machinery Institute. The intent was to determine the performance of the fan in terms of air flow rate, static pressure, input power and total efficiency. The control units were not evaluated and were only used to set fan speed. The louvres were standard equipment and an integral part of the fan unit, so all tests were performed with the louvres in place.

Fan performance was determined at 230 V with the single and variable speed controls. With the Triac type variable speed control, fan performance was determined at the maximum setting, the mid-range setting and the minimum setting. The minimum setting was established by reducing the fan speed to the point where a static pressure of 0.125 in wg (31.1 Pa) could still be obtained.

The fan was also evaluated for ease of operation, operator safety and suitability of the operator's manual.

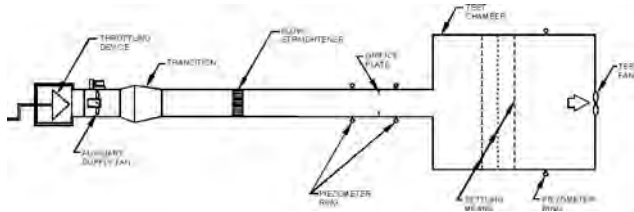


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

RESULTS AND DISCUSSION

FAN PERFORMANCE

All fan performance results in this report are given at standard air¹ conditions so that direct comparisons can be made with other fan test reports. Fan performance under actual operating conditions could differ from these results by up to 10%, depending on such things as temperature, barometric pressure, humidity and elevation above sea level.

Air Flow Rate: Fan output at the maximum setting on the variable speed control was less than in the single speed direct mode (FIGURE 3) due to the voltage drop created by the variable speed control. This resulted in a corresponding reduction in fan speed. Reducing the fan speed, greatly reduced the air flow rate for a given static pressure². For example, at a static pressure of 0.125 in wg (31.1 Pa), reducing the speed from maximum to mid range to minimum setting, reduced the air flow rate from 2980 cfm (1410 L/s) to 1370 cfm (649 L/s) to 177 cfm (84 L/s) respectively.

Air flow rates at typical levels of operation (i.e. static pressure) are given in TABLE 1. The manufacturer provided fan performance data for the single speed, two speed and variable speed modes at 0, 0.10, 0.125 and 0.25 in wg (0, 24.9, 31.1 and 62.3 Pa) static pressure. 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 mode, was 3290 cfm (1550 L/s). PAMI's measured flow rate at the same conditions was 3140 cfm (1480 L/s) or 5% lower than the manufacturer's rating.

Power Consumption: Power consumption is the amount of energy (kWh) used by the fan motor. These numbers can be used directly to determine fan operating costs. For typical levels of static pressure (TABLE 1), the power consumption varied from 0.376 to 0.410 kWh in the single speed direct mode, from 0.388 to 0.435 kWh at maximum speed, from 0.368 to 0.385 kWh at mid range and from 0.249 to 0.265 kWh at minimum speed. The maximum amperage drawn by the motor was 1.8 amps, which was greater than the rated motor amperage of 1.56 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 when using the variable speed control, the

total efficiency (TABLE 1) ranged from 22 to 25% at maximum speed, 7 to 9% at mid range and remained constant at 1% at minimum speed. The total efficiency at maximum fan speed in the single speed direct mode at a static pressure of 0.125 in wg (31.1 Pa) was 28%.

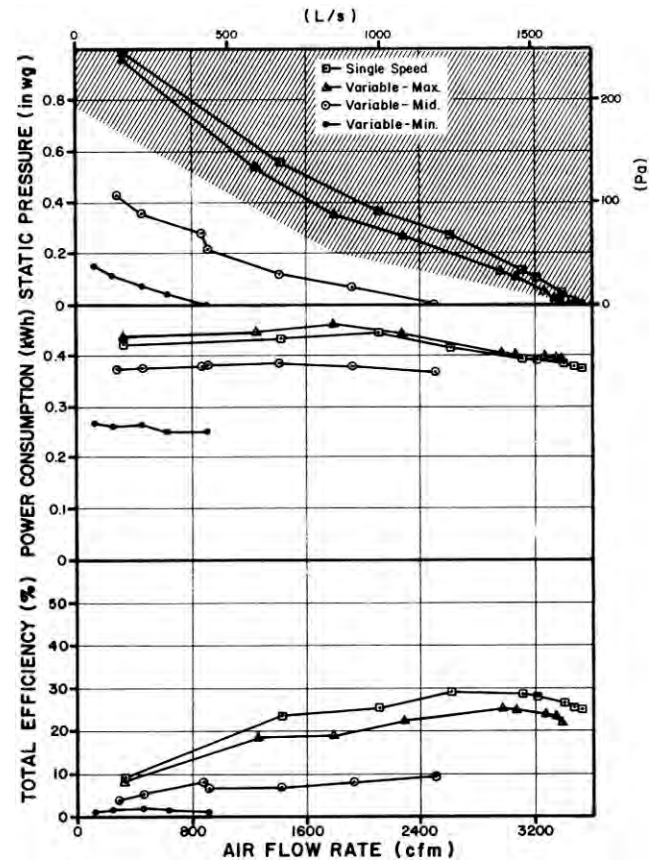


FIGURE 3. Danor Pleasantaire Model SD18-FVX Fan Performance Curves in the Single Speed Mode and at Three Speed Settings in the Variable Speed Mode.

EASE OF OPERATION

Maintenance: The motor and fan was easily removed. This made for easy access to clean the housing and fan blades. Regularly scheduled cleaning and maintenance will ensure longer motor life and optimum performance.

OPERATOR SAFETY

The optional inlet guard grill was not provided but a caution sticker was supplied that stated the fan be mounted at least 8 ft (2.4 m) above the floor or grade level in order to meet CSA standards. The motor was a totally enclosed unit and presented no safety hazards. The model SD18-FVX was CSA approved.

The noise level of the model SD18-FVX, at a distance of 4.9 ft (1.5 m) from the centre of the fan discharge, e, while operating at a 0.125 in wg (31.1 Pa) static pressure, was 79 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The model SD18-FVX 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

There was no operator's manual supplied. It is recommended that the manufacturer supply a detailed manual containing illustrations and information on general operation, installation, maintenance, rated performance, safety aspects and trouble shooting.

¹Standard air is air with a density of 0.075 lbm/ft³ (1.2 kg/m³) which occurs at 68°F (20°C), 50% relative humidity and a barometric pressure of 29.92 in Hg (101.325 kPa).

²Static pressure is a measure of the pressure difference between the pressure inside the building and the pressure on the outside of the building. Static pressure is usually expressed in inches of water gauge (in wg) or Pascals (Pa).

APPENDIX I

SPECIFICATIONS

MAKE: Pleasantaire
MODEL: SD18-FVX
SERIAL NUMBER: 0884
MANUFACTURER: Canarm Limited
 2157 Parkedale Avenue
 Brockville, Ontario
 K6V 5V6

OVERALL DIMENSIONS:
 - housing and flange width 23.3 in (592 mm)
 - housing width 20.8 in (529 mm)
 - housing and flange height 23.3 in (592 mm)
 - housing height 20.8 in (529 mm)
 - housing depth (motor included) 13.6 in (344 mm)
 - housing diameter 18.4 in (468 mm)

IMPELLERS:
 - diameter 17.9 in (456 mm)
 - number of blades 4
 - blade angle variable - at the tip 40°, at the hub 42°

WEIGHT: 38 lb (17 kg)

MOTOR NAMEPLATE DATA:
 make Franklin Electric of Canada Ltd.
 model 1531460400
 frame 56
 code (KVA) C
 code (DATE) F84
 rpm 1140
 service factor 1.0
 ambient temperature rise 40°C
 volts 230 V
 amps 1.56 A
 phase single
 cycles 60 Hz
 horsepower 0.33 hp (249 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
 DANOR PLEASANTAIRE MODEL SD18-FVX
 VENTILATION FAN**

RETAIL PRICE: \$239.00
 (September, 1985, f.o.b. Saskatoon)

FAN DESCRIPTION: 17.9 in (456 mm) propeller fan, single or variable speed, direct drive, 0.33 hp (249 W) 230 V electric motor.

FAN SPEED:
 - single speed 1127 to 1139 rpm
 - variable speed 422 to 1103 rpm

EFFICIENCY RANGE:
 - single speed 25 to 30%
 - variable speed 1 to 25%

EFFICIENCY AT 0.125 in wg (31.1 Pa):
 - single speed 28%

AIR FLOW RATE:
 - range 177 to 3520 cfm (83 to 1660 L/s)
 - at 0.125 in wg (31.1 Pa) 3140 cfm (1480 L/s) at single speed mode

POWER CONSUMPTION: 0.249 to 0.435 kWh

OPERATOR SAFETY: optional inlet guard available
 CSA approved
 noise level = 79 dB(A) at 4.9 ft (1.5 m) from fan discharge

OPERATOR'S MANUAL: None provided

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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