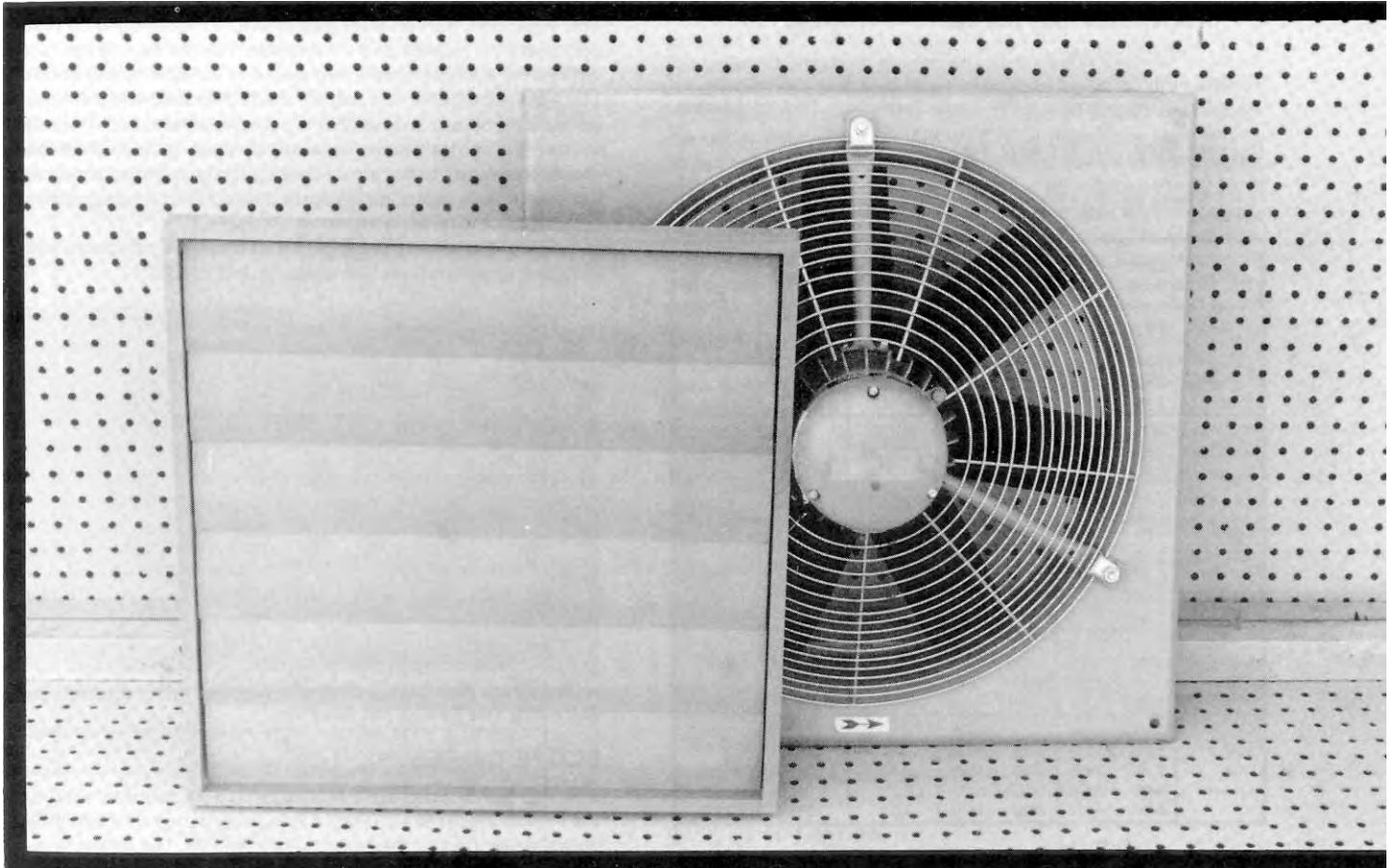


Evaluation Report

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Danor Euro-Style Model EPD18-VX Ventilation Fan

A Co-operative Program Between



DANOR EURO-STYLE MODEL EPD18-VX 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 STK 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:

\$259.00 (September, 1985, f.o.b. Saskatoon, Saskatchewan).

SUMMARY OF RESULTS

TABLE 1. Danor Euro-Style Model EPD18-VX Fan Performance at Typical Levels of Operation.

SETTING	STATIC PRESSURE in wg (Pa)		AIR FLOW RATE cfm (L/s)	POWER CONSUMPTION kWh	TOTAL EFFICIENCY %	FAN SPEED rpm
Single Speed Direct	0.0	(0.0)	3460 (1630)	0.318	32	1741
	0.05	(12.5)	3400 (1610)	0.331	35	1738
	0.10	(24.9)	3310 (1560)	0.341	37	1735
	0.125	(31.1)	3250 (1530)	0.345	38	1733
	0.25	(62.3)	3010 (1420)	0.363	42	1726
Variable Maximum Range	0.0	(0.0)	3360 (1590)	0.315	29	1697
	0.05	(12.5)	3250 (1530)	0.330	31	1683
	0.10	(24.9)	3150 (1490)	0.342	33	1674
	0.125	(31.1)	3100 (1470)	0.345	34	1673
	0.25	(62.3)	2790 (1320)	0.372	36	1645
Variable Mid Range	0.0	(0.0)	2590 (1220)	0.324	13	1311
	0.05	(12.5)	2200 (1040)	0.333	12	1175
	0.10	(24.9)	1720 (810)	0.344	9	1022
	0.125	(31.1)	1510 (714)	0.346	9	977
	0.25	(62.3)	334 (158)	0.347	3	763
Variable Minimum Range	0.0	(0.0)	1540 (730)	0.265	3	805
	0.05	(12.5)	1050 (500)	0.264	3	685
	0.10	(24.9)	424 (200)	0.263	2	619
	0.125	(31.1)	225 (106)	0.264	1	586
	Single Speed with Louvres	0.0	(0.0)	3260 (1540)	0.345	24
0.05		(12.5)	3180 (1500)	0.351	27	1730
0.10		(24.9)	3080 (1450)	0.360	30	1728
0.125		(31.1)	3020 (1420)	0.363	30	1726
0.25		(62.3)	2680 (1270)	0.381	33	1719

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 equip-

ment 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 Euro-Style Model EPD18-VX ventilation fan is a 17.5 in (445 mm) diameter 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 Euro-Style Model EPD18-VX is a flush mounted unit equipped with an inlet guard grill, a mounting face plate, optional PVC louvres and thermostat. The fan can be operated with either a single speed, two speed or variable speed control. The 7 blade propeller and hub are made of plastic and are mounted directly on a 0.335 hp (250 W), single phase, 220 V electric motor. The motor mount consists of three tubular steel bars mounted directly to the motor casing. The galvanized sheet metal housing and motor mounts are coated with a heavy enamel for corrosion protection.

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

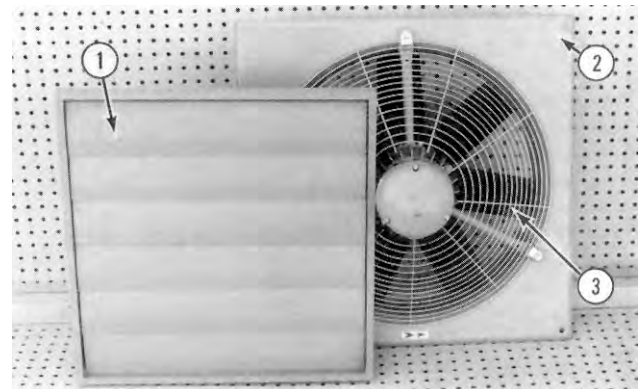


FIGURE 1. Danor Euro-Style Model EPD18-VX Ventilation Fan: (1) Optional Louvres, (2) Mounting Face Plate, (3) Inlet Guard Grill.

SCOPE OF TEST

The Danor Euro-Style Model EPD18-VX 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.

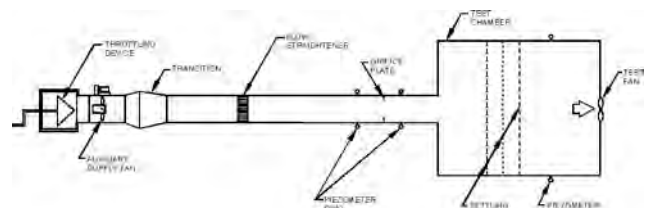


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

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 effect of louvres on fan performance was determined in the single speed mode.

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

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 3100 cfm (1470 L/s) to 1510 cfm (714 L/s) to 225 cfm (106 L/s) respectively.

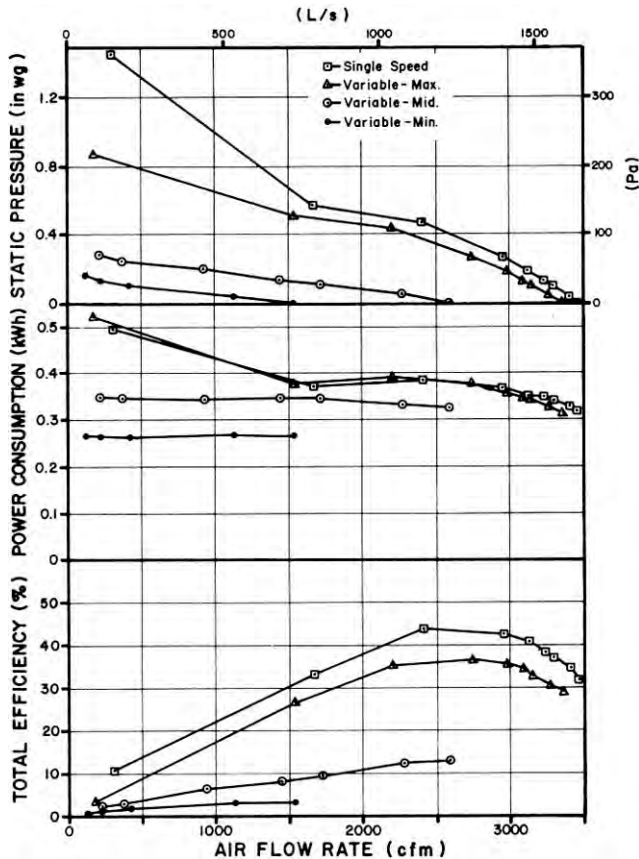


FIGURE 3. Danor Euro-Style Model EPD18-VX Fan Performance Curves in the Single Speed Mode and at Three Speed Settings in the Variable Speed Mode.

Air flow rates at typical levels of operation (i.e. static pressure) are given in TABLE 1. The manufacturer provided fan performance results at 0, 0.10, 0.125 and 0.25 in wg (0, 24.9, 31.1 and 62.3 Pa) static pressure for the single speed mode. 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

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).

0.125 in wg (31.1 Pa), in the single speed mode, was 3408 cfm (1608 L/s). PAMI's measured flow rate at the same conditions was 3250 cfm (1530 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 0.318 to 0.363 kWh in the single speed direct mode, from 0.315 to 0.372 kWh at maximum speed, from 0.324 to 0.347 kWh at mid range and from 0.263 to 0.265 kWh at minimum speed. The maximum rated amperage for the motor was not given so it was impossible to determine whether the motor was overloaded. 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 29 to 36% at maximum speed, 3 to 13% at mid range and 1 to 3% 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 38%.

Effect of Louvres: The optional louvres were installed on the outlet side of the fan (FIGURE 4) to determine their effect on fan output. The fan was tested under these conditions in the single speed mode only. Using the louvres reduced the air flow rate by 6 to 11% (FIGURE 5) 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 7%, from 3250 cfm (1530 L/s) to 3020 cfm (1420 L/s) (TABLE 1). The efficiency was in turn reduced from 38 to 30%. 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.

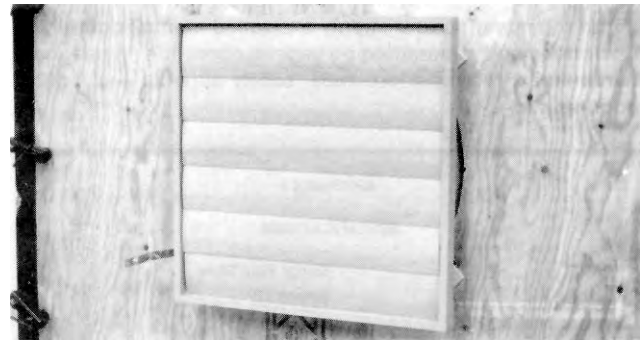


FIGURE 4. Louvres Located on Fan Discharge.

EASE OF OPERATION

Maintenance: The inlet guard grill 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 inlet guard grill provided adequate protection from the fan blades. The motor was a totally enclosed unit and presented no safety hazards. The model EPD18-VX was CSA approved.

The noise level of the model EPD18-VX, 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 74 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The model EPD18-VX 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.

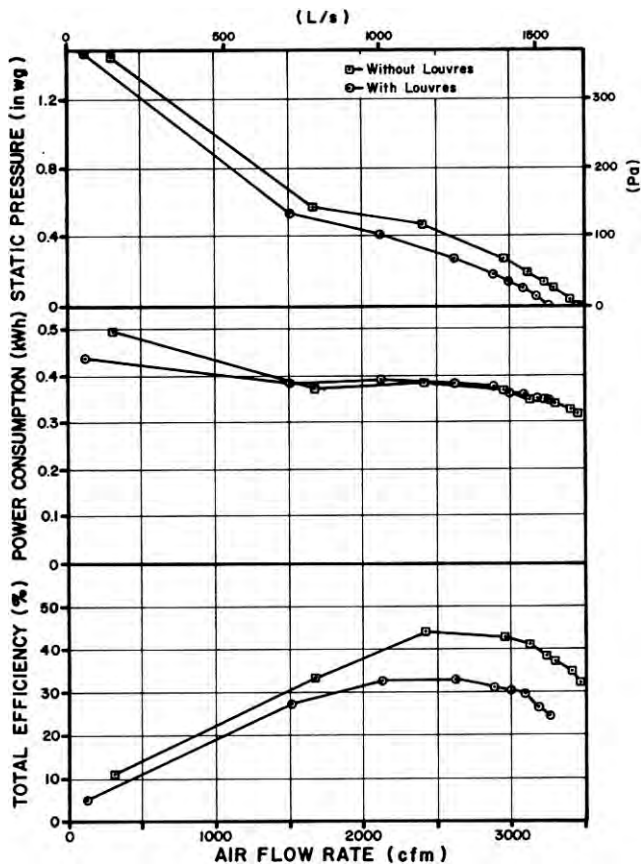


FIGURE 5. Effect of Louvres on Fan Performance.

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.

APPENDIX I

SPECIFICATIONS

MAKE:	Danor Euro-Style
MODEL:	EPD18-VX
SERIAL NUMBER:	HQ-45
MANUFACTURER:	Canarm Limited 2157 Parkedale Avenue Brockville, Ontario K6V 5V6
OVERALL DIMENSIONS:	
- housing width	22.8 in (578 mm)
- housing height	22.8 in (578 mm)
- housing depth (motor included)	11.9 in (302 mm)
- housing diameter	17.9 in (454 mm)
- guard grill diameter	19.3 in (489 mm)
- grill opening	0.13 in (3 mm) diameter wire spaced at 0.38 in (10 mm) in a circular pattern

PROPELLER:

- diameter 17.5 in (445 mm)
- number of blades 7
- blade angle variable - 26° at the tip, 30° at the hub

WEIGHT:

29 lb (13 kg)

MOTOR NAMEPLATE DATA:

class	B
type	4E 45 TK
rpm	1730
ambient temperature rise	40°C
volts	220 V
phase	single
cycles	60 Hz
horsepower	0.335 hp (250 W)

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.

SUMMARY CHART DANOR EURO-STYLE MODEL EPD18-VX VENTILATION FAN

RETAIL PRICE:

\$259.00
(September, 1985, f.o.b. Saskatoon)

FAN DESCRIPTION:

17.5 in (445 mm) propeller fan, variable speed, direct drive, 0.335 hp (250 W) 220 V electric motor.

FAN SPEED:

- single speed 1726 to 1741 rpm
- variable speed 586 to 1697 rpm

EFFICIENCY RANGE:

- without louvres 32 to 42%
- with louvres 24 to 33%

EFFICIENCY AT 0.125 in wg (31.1 Pa):

- without louvres 38%
- with louvres 30%

AIR FLOW RATE:

- range 225 to 3460 cfm (106 to 1630 L/s)
- at 0.125 in wg (31.1 Pa) 3250 cfm (1530 L/s) without louvres and 3020 cfm (1420 L/s) with louvres

POWER CONSUMPTION:

0.263 to 0.381 kWh

OPERATOR SAFETY:

inlet guard provided
CSA approved
noise level - 74 dB(A) at 4.9 ft (1.5 m) from fan discharge

OPERATOR'S MANUAL:

None provided



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