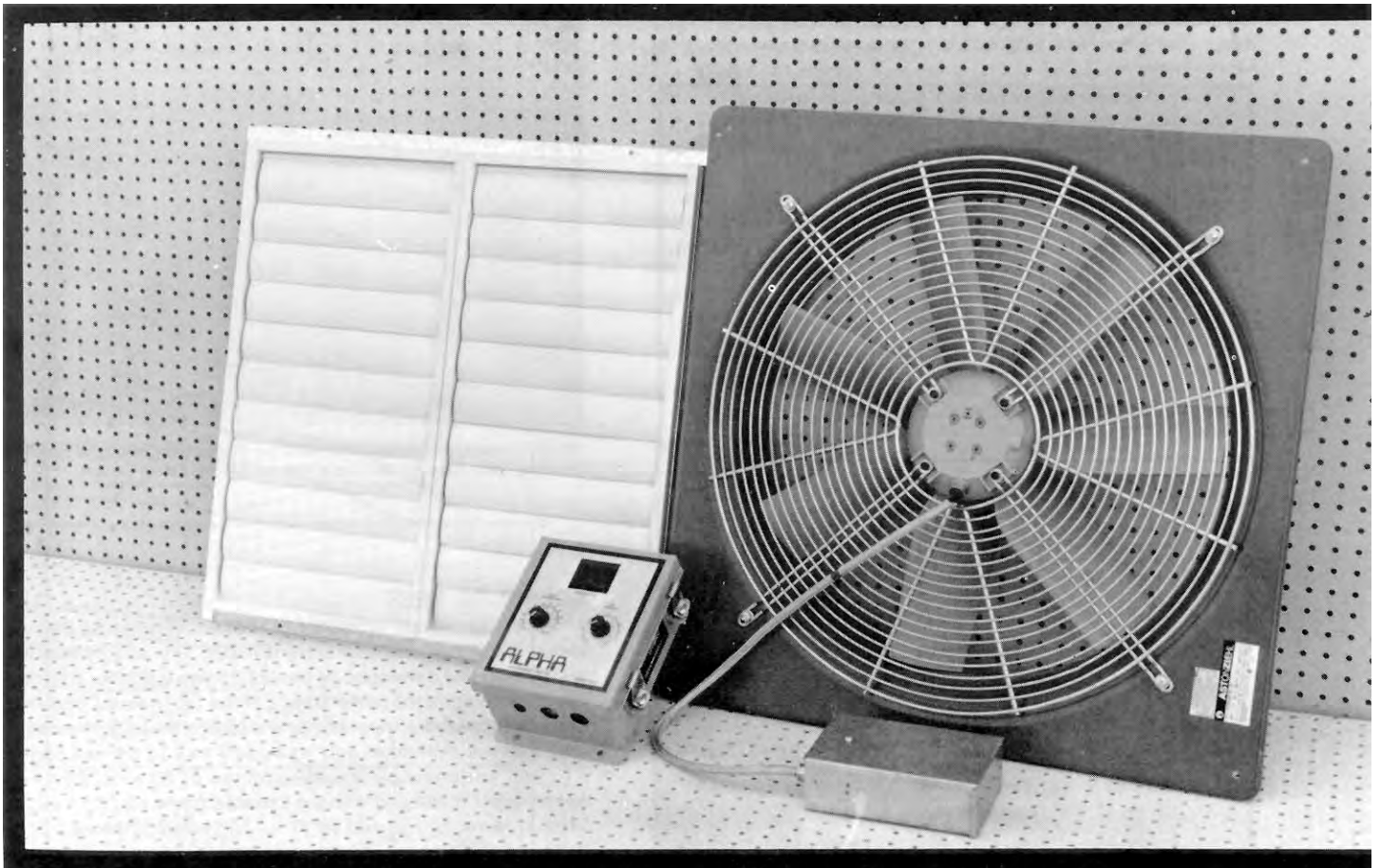


Evaluation Report 574



Aston-Ziehl Model ECDQ-562-6X Ventilation Fan

A Co-operative Program Between



ASTON-ZIEHL MODEL ECDQ-562-6X VENTILATION FAN

MANUFACTURER:

Aston Industries Inc.
P.O. Box 220
St-Leonard d'Aston
Quebec, Canada
J0C 1M0

DISTRIBUTOR:

Nitom Fans & Blowers Inc.
Bay A 1003 55 Ave. N.E.
Calgary, Alberta
T2E 6W1
(For Ont., Man., Sask., Alta. & B.C.)

RETAIL PRICE: \$448.00

(September, 1988, f.o.b. Lethbridge, Alberta).

SUMMARY OF RESULTS

TABLE 1. Aston-Ziehl Model ECDQ-562-6X Ventilation Fan Performance at Typical Levels of Operation.

SETTING	STATIC PRESSURE		AIR FLOW RATE		POWER CONSUMPTION (kW)	TOTAL EFFICIENCY %	FAN SPEED rpm
	in wg	(Pa)	cfm	(L/s)			
Single Speed Direct	0.000	(0.0)	6170	(2910)	0.680	41	1113
	0.050	(12.5)	6030	(2850)	0.689	41	1109
	0.100	(24.9)	5780	(2730)	0.694	42	1108
	0.125	(31.1)	5640	(2660)	0.697	43	1108
	0.250	(62.3)	5050	(2380)	0.711	41	1105
Variable Speed Maximum	0.000	(0.0)	6240	(2950)	0.667	42	1111
	0.050	(12.5)	6030	(2850)	0.674	43	1109
	0.100	(24.9)	5830	(2750)	0.695	43	1104
	0.125	(31.1)	5730	(2700)	0.694	43	1104
	0.250	(62.3)	5160	(2440)	0.705	44	1102
Variable Speed Mid Range	0.000	(0.0)	5240	(2470)	0.608	27	940
	0.050	(12.5)	4930	(2330)	0.617	27	926
	0.100	(24.9)	4640	(2190)	0.622	27	907
	0.125	(31.1)	4490	(2120)	0.628	27	907
	0.250	(62.3)	3530	(1670)	0.634	25	886
Variable Speed Minimum	0.000	(0.0)	3050	(1440)	0.380	9	547
	0.050	(12.5)	2480	(1170)	0.383	8	523
	0.100	(24.9)	1670	(788)	0.378	6	519
	0.125	(31.1)	810	(382)	0.376	3	525
Single Speed Direct with Louvres	0.000	(0.0)	5770	(2720)	0.694	31	1112
	0.050	(12.5)	5390	(2540)	0.704	32	1110
	0.100	(24.9)	5260	(2480)	0.705	32	1108
	0.125	(31.1)	5200	(2450)	0.709	32	1107
	0.250	(62.3)	4420	(2090)	0.714	32	1105

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying fan performance data over a complete range of static pressures.
2. Supplying detailed operating instructions containing illustrations and information on general operation, installation, maintenance, safety aspects and troubleshooting.

Station Manager: R. P. Atkins

Project Engineer: K. Shimek

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Fan performance information is available from the distributor or any retail outlet.
2. Wiring instructions are currently supplied with every fan. Information on maintenance installation and general operating instructions is available from the distributor or any retail outlet. Supplying operating instructions with every fan is under consideration.

GENERAL DESCRIPTION

The Aston-Ziehl Model ECDQ-562-6X Ventilation Fan is a 21.1 in (537 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 Aston-Ziehl Model ECDQ-562-6X Ventilation Fan is a flush mounted unit equipped with a wire inlet guard grill, a mounting face plate, optional PVC louvres and variable speed control. The 7 blade propeller and hub are made of cast aluminum and are mounted directly on a 0.93 hp (690 W), single phase, 230 V electric motor. The motor mount consists of four steel brackets bolted to the motor casing and face plate. The steel housing and motor housing 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.

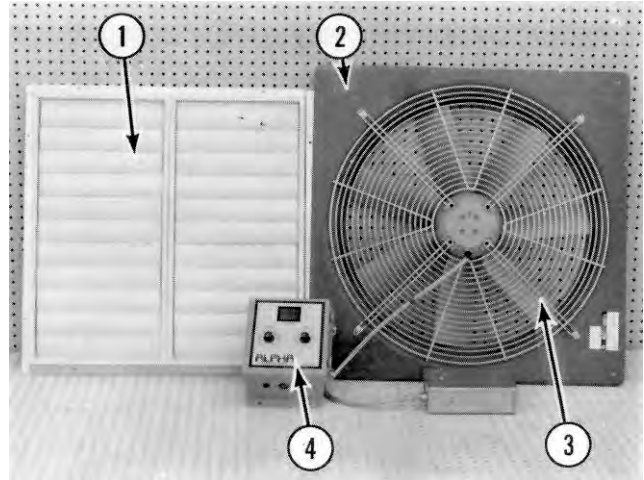


FIGURE 1. Aston-Ziehl Model ECDQ-562-6X Ventilation Fan: (1) Optional Louvres, (2) Mounting Face Plate, (3) Inlet Guard Grill, (4) Variable Speed Control.

SCOPE OF TEST

The Aston-Ziehl Model ECDQ-562-6X Ventilation 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 unit was not evaluated and was used only to set fan speed.

Fan performance was determined at 230V in the single speed direct mode and with the variable speed control. 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, maintenance, operator safety and suitability of the operator's manual.

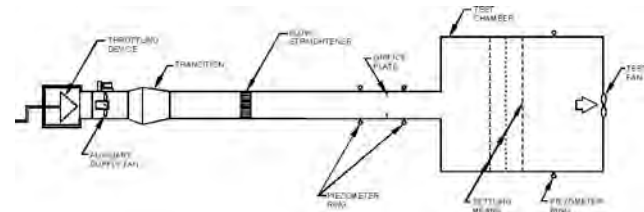


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

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 in both the single speed mode and at the maximum setting on the variable speed control were similar (FIGURE 3). 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 midrange to minimum setting, reduced the air flow rate from 5730 cfm (2700 L/s) to 4490 cfm (2120 L/s) to 810 cfm (382 L/s) respectively. At higher static pressures the reductions were even larger.

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). PAMI's measured flow rate at this condition in the single speed mode was 5640 cfm (2660 L/s). There was no manufacturer's performance information provided. Since building ventilation design is possible over a range of static pressures, it is recommended that, for fan selection purposes, the manufacturer include a table or curve of air flow rates over a complete range of static pressures.

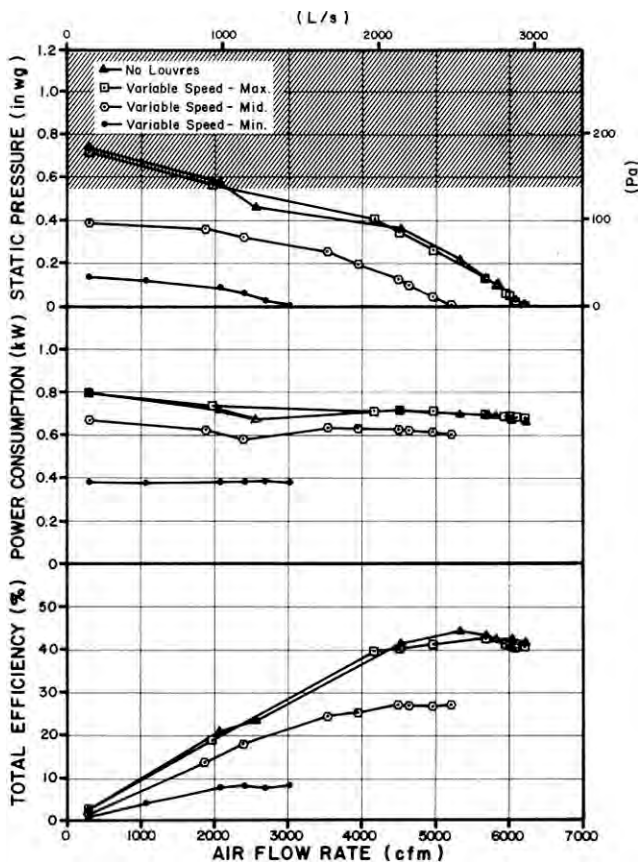


FIGURE 3. Aston-Ziehl Model ECDQ-562-6X Fan Performance Curves.

Power Consumption: The power consumption numbers given in TABLE 1 can be used to calculate the cost of operating the fan. To calculate the cost of fan operation, multiply the power

¹Standard air is air with a density of 0.075 lbf/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).

consumption (kW) by the number of hours of fan operation times the cost per kilowatt hour.

The power consumed by the fan depended on fan speed. For typical levels of static pressure (TABLE 1), the input power varied from 0.680 to 0.711 kW in the single speed mode, from 0.667 to 0.705 kW at maximum speed, from 0.608 to 0.634 kW at mid-range and from 0.376 to 0.383 kW at minimum speed. The maximum amperage drawn by the motor was 3.73 amps, which was greater than the rated motor amperage of 3.00 amps plus the 10% allowable limit established by CSA standards. The shaded zone in FIGURE 3 illustrates operation levels where the rated motor amperage was exceeded. Prolonged operation in excess of 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 42 to 44% at maximum speed, 25 to 27% at midrange and 3 to 9% at minimum speed. The total efficiency at maximum fan speed and a static pressure of 0.125 in wg (31.1 Pa) was 43%.

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 mode only. Using the louvres reduced the air flow rate by 7 to 14% (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 8%, from 5640 cfm (2660 L/s) to 5200 cfm (2450 L/s) (TABLE 1). The efficiency was in turn reduced from 43 to 32%. 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.

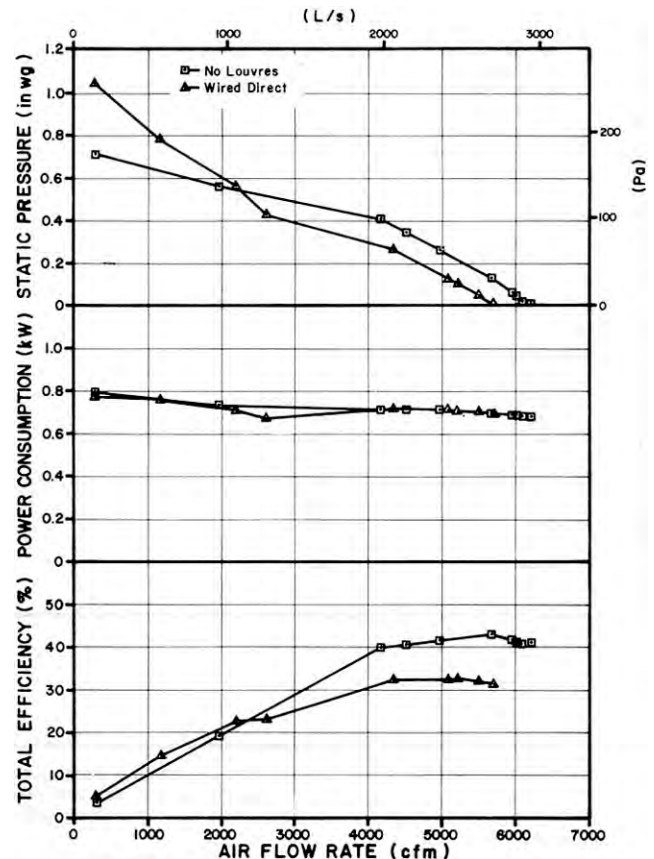


FIGURE 4. Effect of Louvres on Fan Performance.

EASE OF OPERATION

Maintenance: No maintenance instructions were supplied. The inlet guard grill and louvres were easily removed. This made for easy access for cleaning 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 Aston-Ziehl Model ECDQ-562-6X Fan, was CSA approved.

The noise level of the Aston-Ziehl Model ECDQ-562-6X Fan, at a distance of 4.9 ft (1.5 m) from the centre of the fan inlet, while operating at a 0.125 in wg (31.1 Pa) static pressure, was 86 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Aston-Ziehl Model ECDQ-562-6X Fan 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 blower for prolonged periods.

OPERATOR'S MANUAL

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

APPENDIX I	
SPECIFICATIONS	
MAKE:	Aston-Ziehl
MODEL:	ECDQ-562-6X
SERIAL NUMBER:	C-25-7
MANUFACTURER:	Moteurs Aston-Ziehl Inc. St.-Leonard d'Aston Quebec, Canada
OVERALL DIMENSIONS:	
- housing height	28.0 in (711 mm)
- housing width	28.0 in (711 mm)
- housing depth	6.0 in (152 mm)
- motor included	
- housing diameter	21.5 in (546 mm)
- guard grill diameter	24.75 in (629 mm)
- grill opening	0.125 in (3 mm) dia. wire spaced at 0.5 in (13 mm)
IMPELLERS:	
- diameter	21.1 in (537 mm)
- hub diameter	5.25 in (133 mm)
- number of blades	7
- blade angle	43.5° at hub, 59.7° at tip
WEIGHT:	42.0 lb (19 kg)
MOTOR NAMEPLATE DATA:	
make	Aston-Ziehl
model	ECDQ-562-6X
class	B
duty	Cont.
rpm	1075
ambient temperature rise	40°C
volts	240
amps	3.0
phase	1
cycles	60
horsepower	.92 hp (690 w)

APPENDIX II		
NOISE LEVELS 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.

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	= millimeters (mm)
inches water gauge (in wg) x 249.1	= pascals (Pa)
pounds (lb) x 0.45	= kilograms (kg)

SUMMARY CHART ASTON-ZIEHL MODEL ECDQ-562-6X VENTILATION FAN

RETAIL PRICE:	\$448.00 (September, 1988, f.o.b. Lethbridge)
FAN DESCRIPTION:	21.1 in (537 mm) propeller fan, variable speed, direct drive, 0.9 hp (690 W), 240 V electric motor
FAN PERFORMANCE:	
Air Flow Rate:	
- range	810 to 6240 cfm (382 to 2950 L/s)
- at 0.125 in wg (31.1 Pa)	5640 cfm (2660 L/s) without louvres and 5200 cfm (2450 L/s) with louvres
Power Consumption:	0.376 to 0.711 kW
Efficiency Range:	
- without louvres	3 to 44%
- with louvres	31 to 32%
Efficiency at 0.125 in wg (31.1 Pa):	
- without louvres	43%
- with louvres	32%
OPERATOR SAFETY:	inlet guard provided CSA approved noise level = 86 dB(A) at 4.9 ft (1.5 m) from fan inlet
OPERATOR'S MANUAL:	none supplied



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