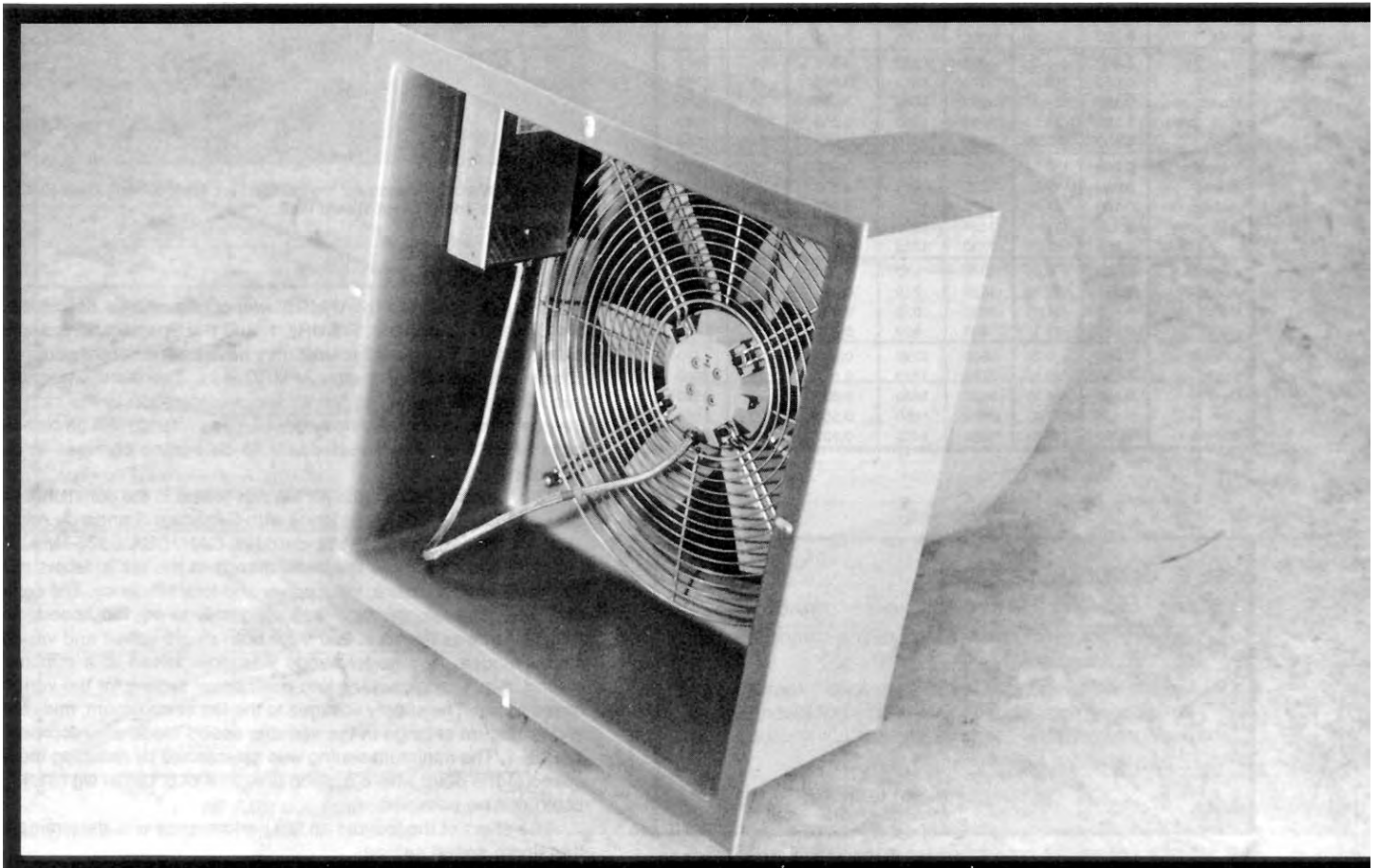


Evaluation Report

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Walbern 18 Inch Magna-Air Ventilation Fan

A Co-operative Program Between



ALBERTA
FARM
MACHINERY
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CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

WALBERN 18 INCH MAGNA-AIR VENTILATION FAN

MANUFACTURER AND DISTRIBUTOR:

Walbern Agri Systems Saskatchewan Ltd.
 2207 Hanselman Court
 Saskatoon, Saskatchewan
 S7L 6A8
 PH: (306) 244-3838

RETAIL PRICE: \$559.00 (May 1991, f.o.b., Lethbridge, Alberta).

SUMMARY OF RESULTS

TABLE 1. Walbern 18" Magna-Air Fan Performance At Typical Levels of Operation.

SETTING	STATIC PRESSURE		AIR FLOW RATE		INPUT POWER kW	TOTAL EFF. %	FAN SPEED rpm
	in wg	(Pa)	cfm	(L/S)			
Single Speed	0.000	(0.0)	4120	1940	0.531	35	1570
Direct	0.050	(12.5)	3980	1880	0.544	36	1570
	0.100	(24.9)	3890	1840	0.554	36	1560
	0.125	(31.1)	3850	1820	0.559	37	1560
	0.250	(62.3)	3560	1680	0.571	38	1540
Variable Speed	0.000	(0.0)	4080	1930	0.538	34	1570
Maximum (226 Volts)	0.050	(12.5)	3970	1870	0.545	35	1560
	0.100	(24.9)	3890	1840	0.555	36	1560
	0.125	(31.1)	3850	1820	0.560	37	1560
	0.250	(62.3)	3530	1670	0.581	38	1540
	Variable Speed	0.000	(0.0)	3740	1770	0.495	27
Mid Range (159 Volts)	0.050	(12.5)	3520	1660	0.500	27	1370
	0.100	(24.9)	3320	1570	0.507	27	1350
	0.125	(31.1)	3220	1520	0.510	27	1330
	0.250	(62.3)	2730	1290	0.512	25	1440
Variable Speed	0.000	(0.0)	1920	910	0.263	7	730
Minimum (95 Volts)	0.050	(12.5)	1520	720	0.260	7	670
	0.100	(24.9)	1080	510	0.260	6	650
	0.125	(31.1)	850	400	0.260	5	690
Single Speed	0.000	(0.0)	3800	1790	0.552	26	1570
Direct With Dampers	0.050	(12.5)	3700	1750	0.557	28	1560
	0.100	(24.9)	3570	1690	0.559	29	1560
	0.125	(31.1)	3500	1650	0.560	30	1550
	0.250	(62.3)	3160	1490	0.567	31	1550

plate. The 7 blade aluminum propeller and aluminum hub are mounted directly on a 1.05 hp (0.78 kW), single phase, 230 volt electric motor. The motor mount is integral with the wire inlet guard grill and is bolted to the motor and fan housing.

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

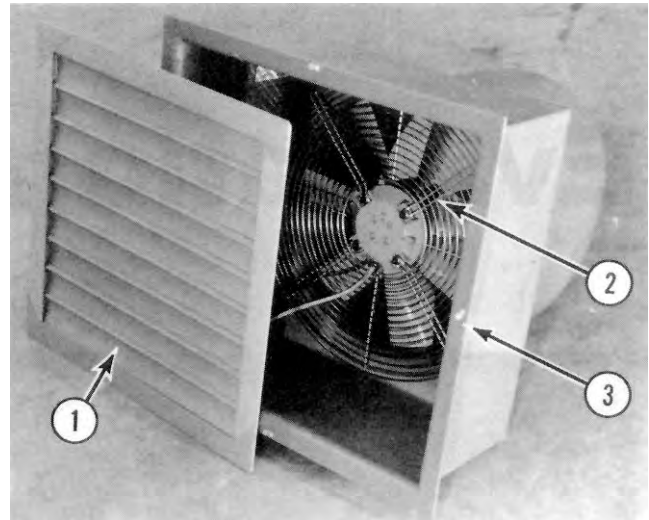


FIGURE 1. Walbern Magna-Air Ventilation Fan: (3) Mounting Face Plate, (1) Inlet Louvres and (2) Inlet Guard Grill.

SCOPE OF TEST

The fan evaluated by AFMRC was configured as described in the General Description, FIGURE 1, and the Specifications section of this report. The manufacturer may have built different configurations of this fan before or after AFMRC tests. Therefore, when using this report check that the fan under consideration is the same as the one reported here. If differences exist, assistance can be obtained from AFMRC or the manufacturer to determine changes in performance.

The Walbern 18" Magna-Air fan was tested in the outlet chamber set-up (FIGURE 2) in accordance with Canadian Standards Association Ventilation Fan Test Standard No. CAN/CSA C320-M86. 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.

The fan was tested at 230 V for both single speed and variable speed modes. Fan performance was determined at a maximum setting, a mid-range setting and a minimum setting for the variable speed mode. The supply voltages to the fan at maximum, mid-range and minimum settings in the variable speed mode are recorded in TABLE 1. 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 the louvres on fan performance was determined in the single speed setting.

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

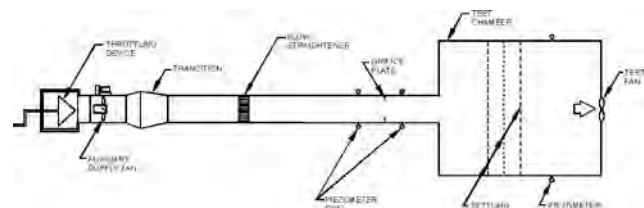


FIGURE 2. Schematic of Fan Test Apparatus-Inlet Chamber Setup.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying fan performance data over a complete range of static pressures.
2. Update the operator's manual to include information on fan general operation, maintenance, installation, rated performance, safety aspects and trouble shooting.

Manager: R.P. Atkins

Project Engineer: R.C. Maze

THE MANUFACTURER STATES THAT:

With regard to recommendation number:

1. The airflow information obtained from Alberta Farm Machinery Research Centre tests will be available.
2. No operator's manual is available.

GENERAL DESCRIPTION

The Walbern Magna-Air ventilation fan is a 17.3 in (438 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.

The Walbern Magna-Air ventilation fan is a flush-mounted unit equipped with an inlet guard grill, inlet louvres and a mounting face

RESULTS AND DISCUSSION

Fan Performance: All fan performance results in this report are given at standard air¹ so that direct comparisons can be made with other fan test results. 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 pressure.² 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 3850 cfm (1820 L/s) to 3220 cfm (1520 L/s) to 850 cfm (400 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). The AFMRC's measured flow rate in a single speed direct mode at 0.125 in wg (31.1 Pa) was 3850 cfm (1820 L/s). There was no manufacturer's information provided on air flow rates. 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.

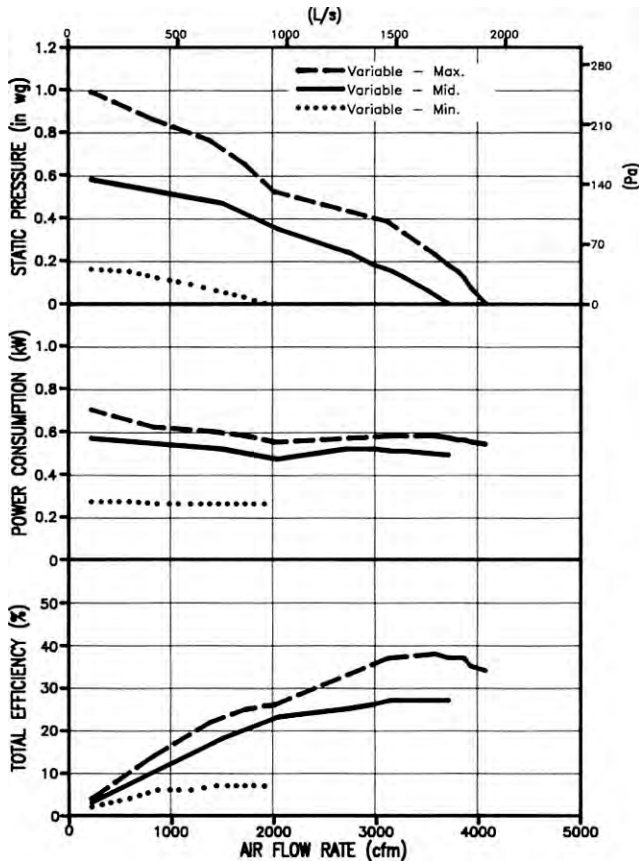


FIGURE 3. Walbern 18" Magna-Air Fan Performance Curves

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

The power consumed by the fan depends on fan speed. For typical levels of static pressure (TABLE 1), the input power varied from 0.531 to 0.571 kW in the single speed mode, from 0.538 to 0.581 kW at maximum speed, from 0.495 to 0.512 kW at mid-range speed and from 0.260 to 0.263 kW at minimum speed. The maximum amperage drawn by the motor was 2.9 amperes, which was less than the rated motor amperage of 3.3 amperes.

Total Efficiency: Total efficiency is the ratio of air horsepower over the input power. Air horsepower is dependent upon the air flow

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 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).

rate and corresponding total pressure. For typical levels of operation the total efficiency (TABLE 1) using the variable speed control ranged from 34 to 38% at maximum speed, 25 to 27% at mid-range and 5 to 7% at minimum speed. The total efficiency at maximum fan speed and a static pressure of 0.125 in wg (31.1 Pa) was 37%.

Effect of Louvres: The optional louvres were installed on the inlet 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 7 to 11% (FIGURE 5) over a typical range of operation. For example, at a static pressure of 0.125 in wg (31.1 Pa), the louvres reduced the air flow by 9%, from 3850 cfm (1820 L/s) to 3500 cfm (1650 L/s) (TABLE 1). The efficiency was in turn reduced from 37 to 30%.

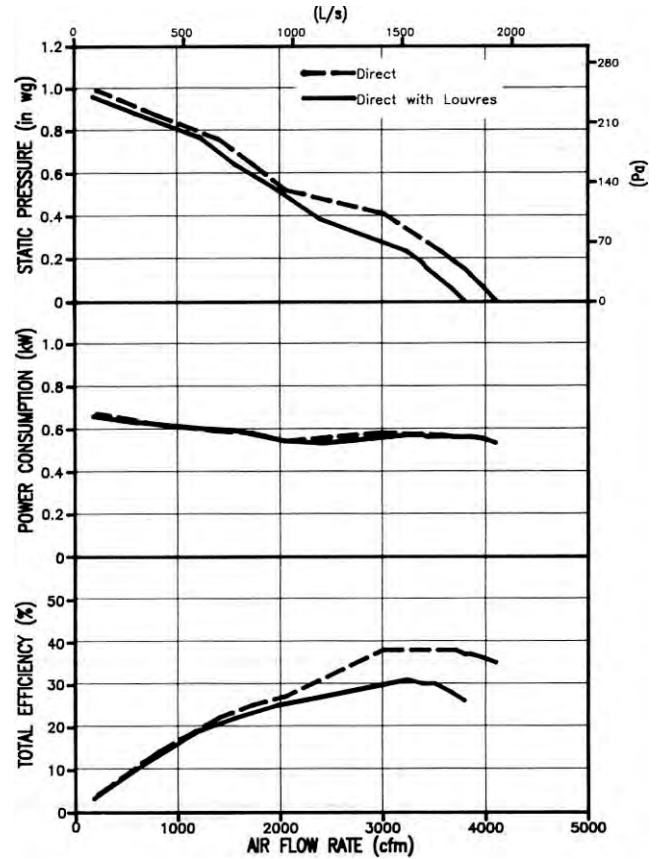


FIGURE 4. Effect of Louvres on Fan Performance

EASE OF OPERATION

Maintenance:

No maintenance instructions were supplied. The inlet louvres were easily removed, which made for easy access to clean the fan blades and housing. 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 Walbern 18" Magna-Air ventilation fan was CSA approved.

The noise level of the Walbern 18" Magna-Air 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 80 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Walbern 18" Magna-Air ventilation fan falls within Range 3 of the AFMRC 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

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

APPENDIX I SPECIFICATIONS	
MAKE:	Walbern
MODEL:	18" Magna-Air
MANUFACTURER:	Walbern Agri Systems Saskatchewan Ltd. 2207 Hanselman Court Saskatoon, Saskatchewan S7L 6A8
OVERALL DIMENSIONS:	
- housing width	25.0 in (635 mm)
- housing depth	26.0 in (660 mm) (motor included)
- housing height	25.0 in (635 mm)
- discharge opening	17.5 in (445 mm)
- guard grill diameter	20.8 in (528 mm)
- grill opening	0.13 in (3 mm) diameter wire spaced at 0.5 in (13 mm)
IMPELLER:	
- diameter	17.3 in (438 mm)
- hub diameter	5.75 in (146 mm)
- number of blades	7
- blade angle	44° Hub, 35° Tip
WEIGHT:	39 lb (17.5 kg)
MOTOR NAMEPLATE DATA:	
make	Aston Ziehl
model	ECDQ-451-4X
serial number	E-41-05
ins. class	B
cap. / cond.	10.0 uF
rpm	1450
ambient temperature rise	40° C
volts	240
amps	3.3
phase	1
cycles	60
horsepower listed	1.05 hp (780 W) 12G4

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

WALBERN 18" MAGNA-AIR VENTILATION FAN

RETAIL PRICE:	\$559.00 (May 1991, f.o.b. Lethbridge)
FAN DESCRIPTION:	17.3 in (438 mm) propeller fan, variable speed, direct drive, 1.05 hp (780 W), 230 volt electric motor.
FAN PERFORMANCE:	
Air Flow Rate:	
- range	850 to 4120 cfm (400 to 1940 L/s)
- at 0.125 in wg (31.1 Pa)	3850 cfm (1820 L/s) without louvres, 3500 cfm (1650 L/s) with louvres
Power Consumption:	0.260 to 0.581 kW
Efficiency Range:	
- without louvres	35 to 38%
- with louvres	26 to 31%
Efficiency at 0.125 in wg (31.1 Pa):	
- without louvres	37%
- with louvres	30%
OPERATOR SAFETY:	inlet guard provided CSA approved noise level = 80 dB(A) at 4.9 ft (1.5 m) from fan inlet
OPERATOR'S MANUAL:	None supplied



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