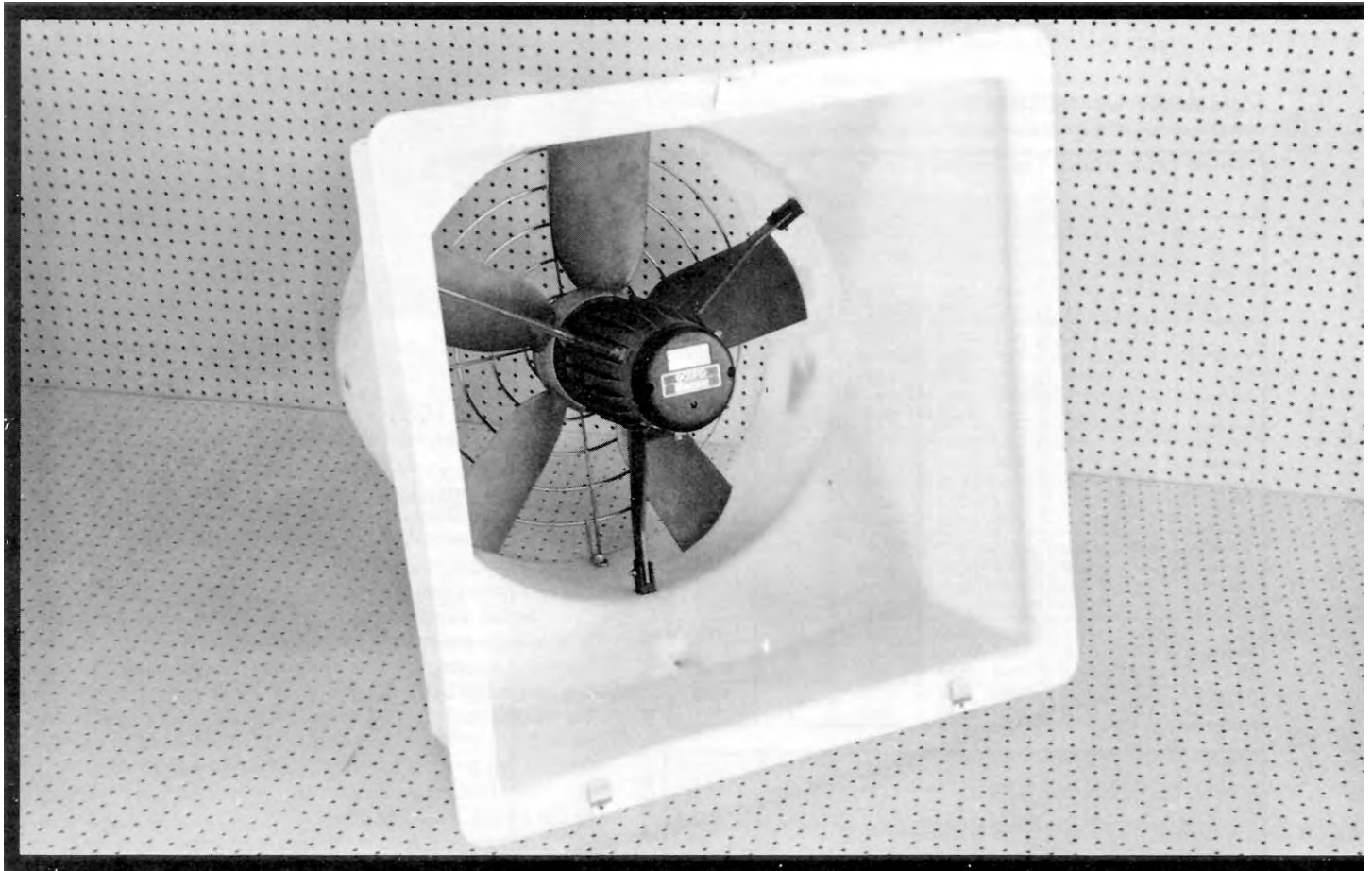


# Evaluation Report

# 617



## Agrifan 24" Ventilation Fan

A Co-operative Program Between



## AGRIFAN 24" VENTILATION FAN

### MANUFACTURER:

Godro Inc.  
C.P. 280  
Roxton Pond, Quebec  
JOE 170

### DISTRIBUTORS:

Better Air Manufacturing  
P.O. Box 490  
McGregor, Manitoba  
ROH 0R0

Exacon Inc.  
97 Thames Road  
Exeter, Ontario  
NOM 1S0

Nitom Fans & Blowers Inc.  
#207, 20216 Fraser Highway  
Langley, BC  
V3A 4E6

RETAIL PRICE: \$540.75 (October, 1989, f.o.b., Lethbridge, Alberta)

## SUMMARY OF RESULTS

TABLE 1. Agrifan 24" 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)	6700	(3160)	0.615	33	1095
	0.050	(12.5)	6450	(3050)	0.625	35	1091
	0.100	(24.9)	6250	(2950)	0.638	37	1086
	0.125	(31.1)	6160	(2910)	0.645	38	1084
Direct	0.250	(62.3)	5550	(2620)	0.677	41	1074
	0.000	( 0.0)	6740	(3180)	0.626	32	1091
	0.050	(12.5)	6480	(3060)	0.645	34	1088
	0.100	(24.9)	6270	(2960)	0.663	36	1083
Variable Speed Maximum	0.125	(31.1)	6170	(2910)	0.671	37	1081
	0.250	(62.3)	5520	(2600)	0.695	39	1072
	0.000	( 0.0)	6120	(2890)	0.515	30	994
	0.050	(12.5)	5840	(2760)	0.522	32	984
Variable Speed Mid Range	0.100	(24.9)	5580	(2660)	0.534	34	965
	0.125	(31.1)	5440	(2570)	0.539	34	956
	0.250	(62.3)	4480	(2110)	0.543	35	944
	0.000	( 0.0)	3550	(1670)	0.267	11	565
Variable Speed Minimum	0.050	(12.5)	2800	(1320)	0.268	12	520
	0.100	(24.9)	1900	(895)	0.268	11	538
	0.125	(31.1)	1160	(549)	0.268	7	514
	0.000	( 0.0)	5990	(2830)	0.633	23	1086
Direct With Louvres	0.050	(12.5)	5800	(2740)	0.648	26	1083
	0.100	(24.9)	5570	(2630)	0.660	28	1080
	0.125	(31.1)	5450	(2570)	0.663	28	1079
	0.250	(62.3)	4730	(2230)	0.657	32	1077

## 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.

Manager: R. R Atkins

Project Engineer: Robert Maze

## THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Fan performance data over a complete range of static pressure will be supplied, if requested.
2. Wiring diagrams, service center locations and installation instructions will be supplied with each unit.

## GENERAL DESCRIPTION

The Agrifan 24" ventilation fan is a 24.0 in (610 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 Agrifan 24" ventilation fan is a flush-mounted unit equipped with a wire outlet guard grill, inlet louvres, optional five speed control and mounting face plate. The 5 blade polypropylene propeller and aluminum hub are mounted directly on a 0.91 hp (0.68 kW), single phase, 220 V electric motor. The housing is constructed out of molded polypropylene treated UV. The motor mount consists of three enamel coated metal brackets bolted to the housing.

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

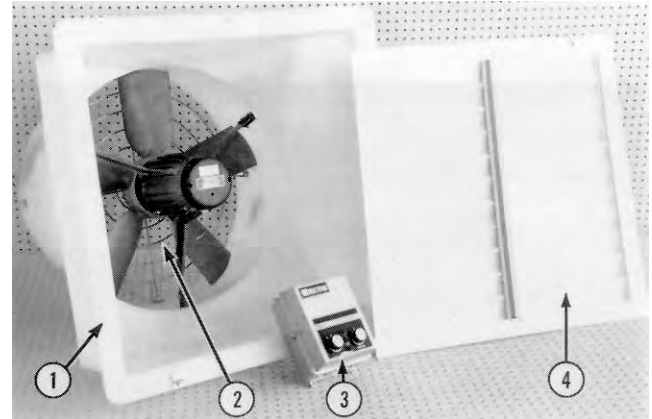


FIGURE 1. Agrifan 24" Ventilation Fan: (1) Mounting Face Plate, (2) Outlet Guard Grill, (3) Five-Speed Control, (4) Inlet Louvres.

## SCOPE OF TEST

The Agrifan 24" was tested in the inlet chamber set-up (FIGURE 2) in accordance with test procedures developed by the Prairie Agricultural Machinery Institute and adopted by the Alberta Farm Machinery Research Centre. 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. With the Multifan STW-A variable speed control, fan performance was determined at the maximum setting, the mid-range setting and the minimum setting with the variable speed control. The minimum setting was established by selecting a fan speed at a setting 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 setting.

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

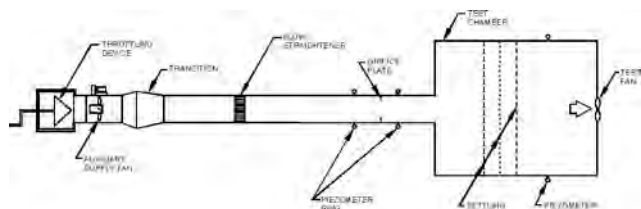


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Set-Up.

## RESULTS AND DISCUSSION

### FAN PERFORMANCE

All fan performance results in this report are given at standard air<sup>1</sup> conditions so that direct comparisons can be made

<sup>1</sup> Standard air is air with a density of 0.075 lbm/ft<sup>3</sup> (1.2 kg/m<sup>3</sup>) which occurs at 68°F (20°C), 50% relative humidity and a barometric pressure of 29.92 in Hg (101.325 kPa).

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 pressure<sup>2</sup>. 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 6170 cfm (2910 L/s) to 5440 cfm (2570 L/s) to 1160 cfm (549 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). Alberta Farm Machinery Research Centre's measured flow rate in the single speed mode was 6160 cfm (2910 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.

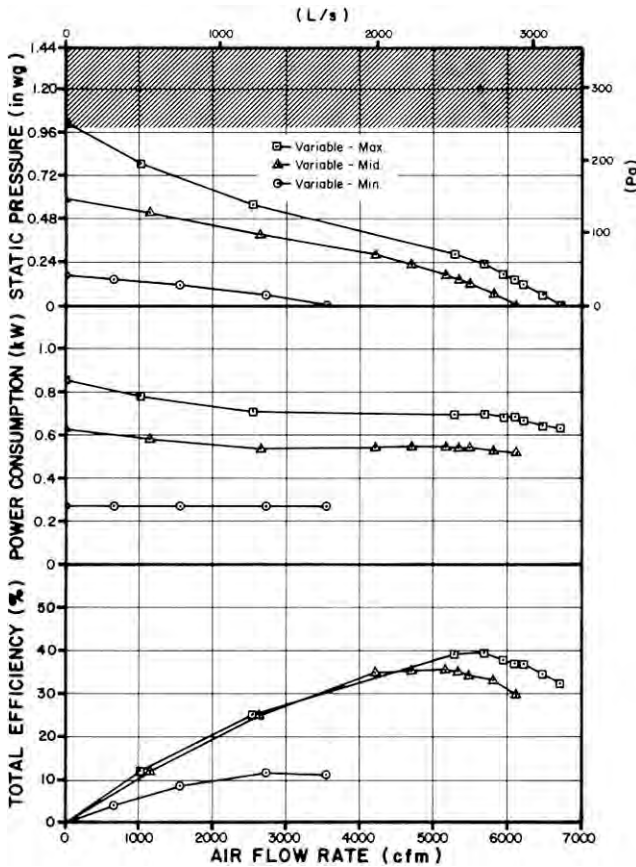


FIGURE 3. Agrifan 24" Fan Performance Curves.

**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 depended on fan speed. For typical levels of static pressure (TABLE 1), the input power varied from 0.615 to 0.677 kW in the single speed mode, from 0.626 to 0.695 kW at maximum speed, from 0.515 to 0.543 kW at mid-range and from 0.267 to 0.268 kW at minimum speed. The maximum amperage drawn by the motor was 3.48 amps, which

<sup>2</sup>Static 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).

was greater than the rated motor amperage of 3.1 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 32 to 39% at maximum speed, 30 to 35% at mid-range and 7 to 12% 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 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 10 to 15% (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 11%, from 6160 cfm (2910 L/s) to 5450 cfm (2570 L/s) (TABLE 1). The efficiency was in turn reduced from 38 to 28%. The use of other control devices such as shutters, 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.

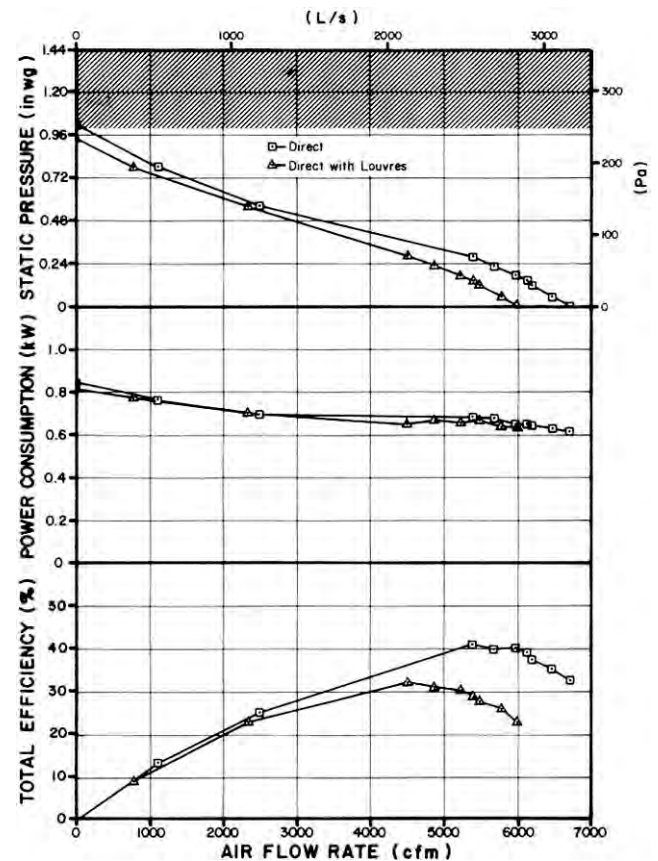


FIGURE 4. Effect of Louvres on Fan Performance.

#### EASE OF OPERATION

**Maintenance:** No maintenance instructions were supplied. The inlet 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 outlet guard grill provided adequate protection from the fan blades. The motor was a totally enclosed unit and presented no safety hazards. The Agrifan 24" was CSA approved.

The noise level of the Agrifan 24" 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 81 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Agrifan 24" falls within range 3 of the Alberta Farm Machinery Research Centre 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 operator's instruction sheet contained information on wiring the fan motor. 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

<b>MAKE:</b>	Agrifan
<b>MODEL:</b>	24"
<b>SERIAL NUMBER:</b>	8708
<b>MANUFACTURER:</b>	Godro Inc. C.P. 280 Roxton Pond, Quebec J0E 1Z0
<b>OVERALL DIMENSIONS:</b>	
- housing width	25.5 in (648 mm)
- housing depth (motor included)	25.25 in (641 mm)
- housing height	25.5 in (648 mm)
- discharge opening	24.63 in (626 mm)
- outlet guard grill diameter	20.5 in (521 mm)
- grill opening	0.19 in (5 mm) dia. wire spaced at 2.0 in (51 mm) in a circular pattern
<b>IMPELLER:</b>	
- diameter	24.0 in (610 mm)
- hub diameter	6.25 in (159 mm)
- number of blades	5
- blade angle	Hub 29°, Tip 17°
<b>WEIGHT:</b>	58.6 lb (26.6 kg)
<b>MOTOR NAMEPLATE DATA:</b>	
make	A. Vostermans BV Vento Holland
model	6E63
rpm	1000
volts	220
amps	31
phase	Single
cycles	60
horsepower	0.91 hp (0.68 kW)

#### APPENDIX II

##### NOISE LEVELS RANGES

RANG E	SOUND LEVEL (dBA)	COM MENTS
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 AGRIFAN 24" VENTILATION FAN

<b>RETAIL PRICE:</b>	\$540.75 (October, 1989, f.o.b. Lethbridge)
<b>FAN DESCRIPTION:</b>	24.0 in (610 mm) propeller fan, variable speed, direct drive, 0.91 hp (0.68 kW), 220 V electric motor.
<b>FAN PERFORMANCE:</b>	
<b>Air Flow Rate:</b>	
- range	1160 to 6740 cfm (549 to 3180 L/s)
- at 0.125 in wg (31.1 Pa)	6160 cfm (2910 L/s) without louvres 5450 cfm (2570 L/s) with louvres
<b>Power Consumption:</b>	0.267 to 0.695 kW
<b>Efficiency Range:</b>	
- without louvres	33 to 41%
- with louvres	23 to 32%
<b>Efficiency at 0.125 in wg (31.1 Pa):</b>	
- without louvres	38%
- with louvres	28%
<b>OPERATOR SAFETY:</b>	Outlet guard provided CSA approved noise level - 81 dB(A) at 4.9 ft (1.5 m) from fan inlet
<b>OPERATOR'S MANUAL:</b>	None supplied



**ALBERTA  
FARM  
MACHINERY  
RESEARCH  
CENTRE**

3000 College Drive South  
Lethbridge, Alberta, Canada T1K 1L6  
Telephone: (403) 329-1212  
FAX: (403) 329-5562  
<http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html>

#### Prairie Agricultural Machinery Institute

Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0  
Telephone: (306) 682-2555

Test Stations:  
P.O. Box 1060  
Portage la Prairie, Manitoba, Canada R1N 3C5  
Telephone: (204) 239-5445  
Fax: (204) 239-7124

P.O. Box 1150  
Humboldt, Saskatchewan, Canada S0K 2A0  
Telephone: (306) 682-5033  
Fax: (306) 682-5080