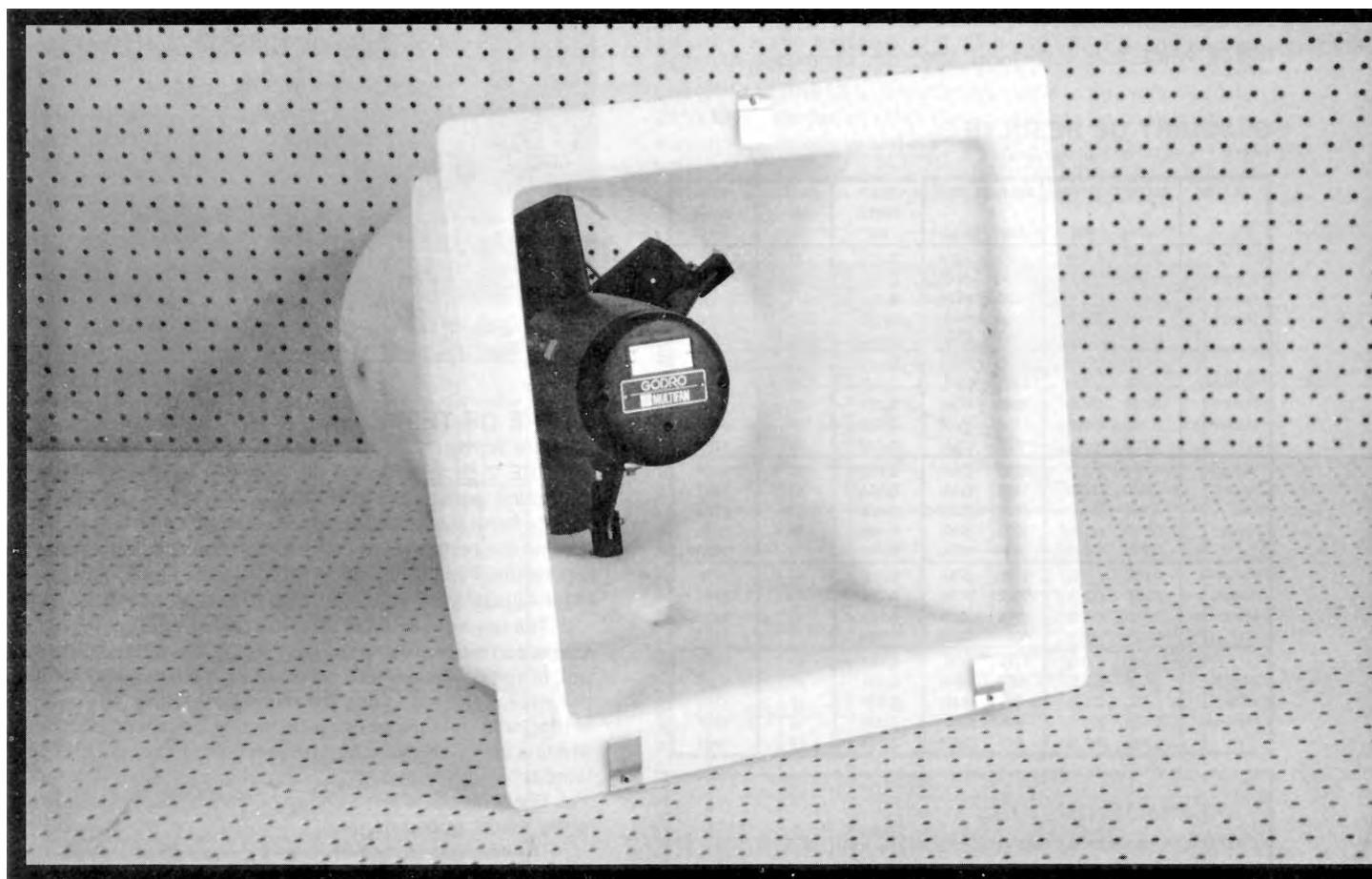


# Evaluation Report

# 612



## Agrifan 12" Ventilation Fan

A Co-operative Program Between



## AGRIFAN 12" VENTILATION FAN

### MANUFACTURER:

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

### DISTRIBUTORS:

Better Air Manufacturing  
P.O. Box 490  
McGregor, Manitoba  
R0H 0R0

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

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

**RETAIL PRICE:** \$345.45 (October, 1989, f.o.b., Lethbridge, Alberta)

## SUMMARY OF RESULTS

TABLE 1. Agrifan 12" 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 Direct	0.000	( 0.0)	1320	(621)	0.101	21	1706
	0.050	(12.5)	1270	(598)	0.105	24	1696
	0.100	(24.9)	1180	(555)	0.106	28	1691
	0.125	(31.1)	1140	(536)	0.107	28	1642
Variable Speed Maximum	0.250	(62.3)	621	(293)	0.100	23	1707
	0.000	( 0.0)	1330	(627)	0.118	18	1703
	0.050	(12.5)	1260	(595)	0.120	22	1702
	0.100	(24.9)	1200	(564)	0.121	25	1703
Variable Speed Mid Range	0.125	(31.1)	1150	(543)	0.122	26	1701
	0.250	(62.3)	622	(294)	0.110	19	1708
	0.000	( 0.0)	1260	(594)	0.102	18	1618
	0.050	(12.5)	1180	(558)	0.106	21	1603
Variable Speed Minimum	0.100	(24.9)	1110	(521)	0.108	23	1598
	0.125	(31.1)	1050	(496)	0.108	24	1596
	0.250	(62.3)	584	(276)	0.101	17	1630
	0.000	( 0.0)	1140	(539)	0.100	14	1479
Direct With Louvres	0.050	(12.5)	1020	(479)	0.106	15	1415
	0.100	(24.9)	906	(428)	0.104	16	1399
	0.125	(31.1)	851	(402)	0.105	17	1417
	0.000	( 0.0)	1140	(536)	0.104	13	1697
Direct With Louvres	0.050	(12.5)	1050	(494)	0.104	17	1696
	0.100	(24.9)	952	(449)	0.101	17	1703
	0.125	(31.1)	835	(394)	0.098	18	1707
	0.250	(62.3)	567	(268)	0.104	17	1699

## 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 12" ventilation fan is a 12.5 in (318 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 12" 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 6 blade polypropylene propeller and plastic hub are mounted directly on a 0.15 hp (0.11 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.

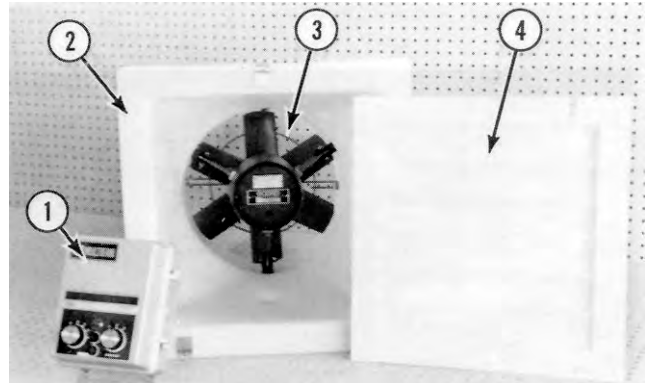


FIGURE 1. Agrifan 12" Ventilation Fan: (1) Five-Speed Control, (2) Mounting Face Plate, (3) Outlet Guard Grill, (4) Inlet Louvres.

## SCOPE OF TEST

The Agrifan 12" 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. Using the Multifan STW-A 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 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.

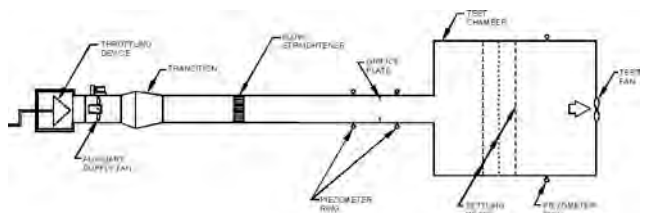


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Set-Up.

## 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 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 1150 cfm (543 L/s) to 1050 cfm (496 L/s) to 851 cfm (402 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 1140 cfm (536 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.

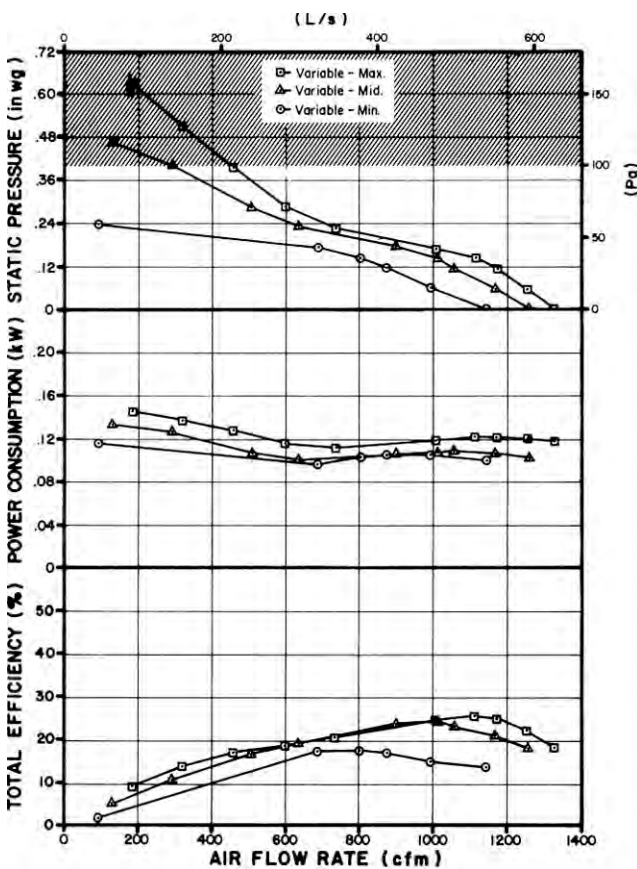


FIGURE 3. Agrifan 12" Fan Performance Curves.

**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 0.100 to 0.107 kW in the single speed mode, from 0.110 to 0.122 kW at maximum speed, from 0.101 to 0.108 kW at

<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).

<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).

mid-range and from 0.100 to 0.105 kW at minimum speed. The maximum amperage drawn by the motor was 0.66 amps, which was greater than the rated motor amperage of 0.5 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 18 to 26% at maximum speed, 17 to 24% at mid-range and 14 to 17% at minimum speed. The total efficiency at maximum fan speed and a static pressure of 0.125 in wg (31.1 Pa) was 26%.

**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 9 to 26% (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 26%, from 1140 cfm (536 L/s) to 835 cfm (394 L/s) (TABLE 1). The efficiency was in turn reduced from 28 to 18%. 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.

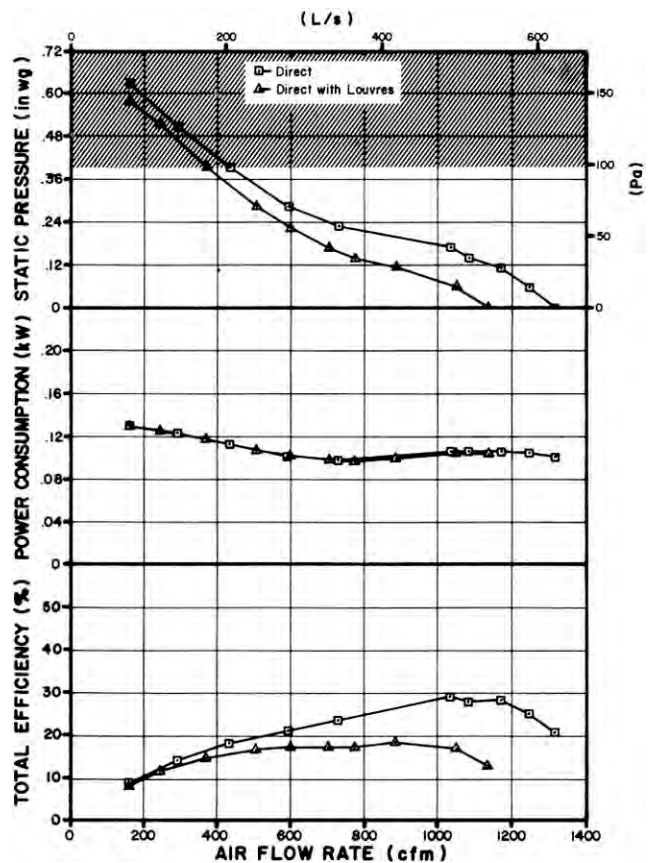


FIGURE 4. Effect of Louvres on Fan Performance.

## 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 12" was CSA approved.

The noise level of the Agrifan 12" 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 72 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Agrifan 12" 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 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 I	
SPECIFICATIONS	
<b>MAKE:</b>	Agrifan
<b>MODEL:</b>	12"
<b>SERIAL NUMBER:</b>	9088
<b>MANUFACTURER:</b>	Godro Inc. C.P. 280 Roxton Pond, Quebec J0E 1Z0
<b>OVERALL DIMENSIONS:</b>	
- housing width	15.8 in (401 mm)
- housing depth (motor included)	25.9 in (658 mm)
- housing height	15.8 in (401 mm)
- discharge opening	12.8 in (325 mm)
- guard grill diameter	9.0 in (229 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	12.5 in (318 mm)
- hub diameter	3.75 in (95 mm)
- number of blades	6
- blade angle	Hub 32°, Tip 25°
<b>WEIGHT:</b>	25.4 lb (11.5 kg)
<b>MOTOR NAMEPLATE DATA:</b>	
make	A. Yostermans BV Venlo Holland
model	4E30
rpm	1600
volts	220
amps	0.5
phase	Single
cycles	60
horsepower	0.15 hp (110 W)

SUMMARY CHART	
AGRIFAN 12" VENTILATION FAN	
<b>RETAIL PRICE:</b>	\$345.45 (October, 1989, f.o.b. Lethbridge)
<b>FAN DESCRIPTION:</b>	12.5 in (318 mm) propeller fan, variable speed, direct drive, 0.15 hp (110 W), 220 V electric motor.
<b>FAN PERFORMANCE:</b>	
<b>Air Flow Rate:</b>	
- range	567 to 1330 cfm (268 to 627 L/s)
- at 0.125 in wg (31.1 Pa)	1140 cfm (536 L/s) without louvres 835 cfm (394 L/s) with louvres
<b>Power Consumption:</b>	0.098 to 0.122 kW
<b>Efficiency Range:</b>	
- without louvres	21 to 28%
- with louvres	13 to 18%
<b>Efficiency at 0.125 in wg (31.1 Pa):</b>	
- without louvres	28%
- with louvres	18%
<b>OPERATOR SAFETY:</b>	Outlet guard provided CSA approved noise level - 72 dB(A) at 4.9 ft (1.5 m) from fan inlet
<b>OPERATOR'S MANUAL:</b>	None supplied



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