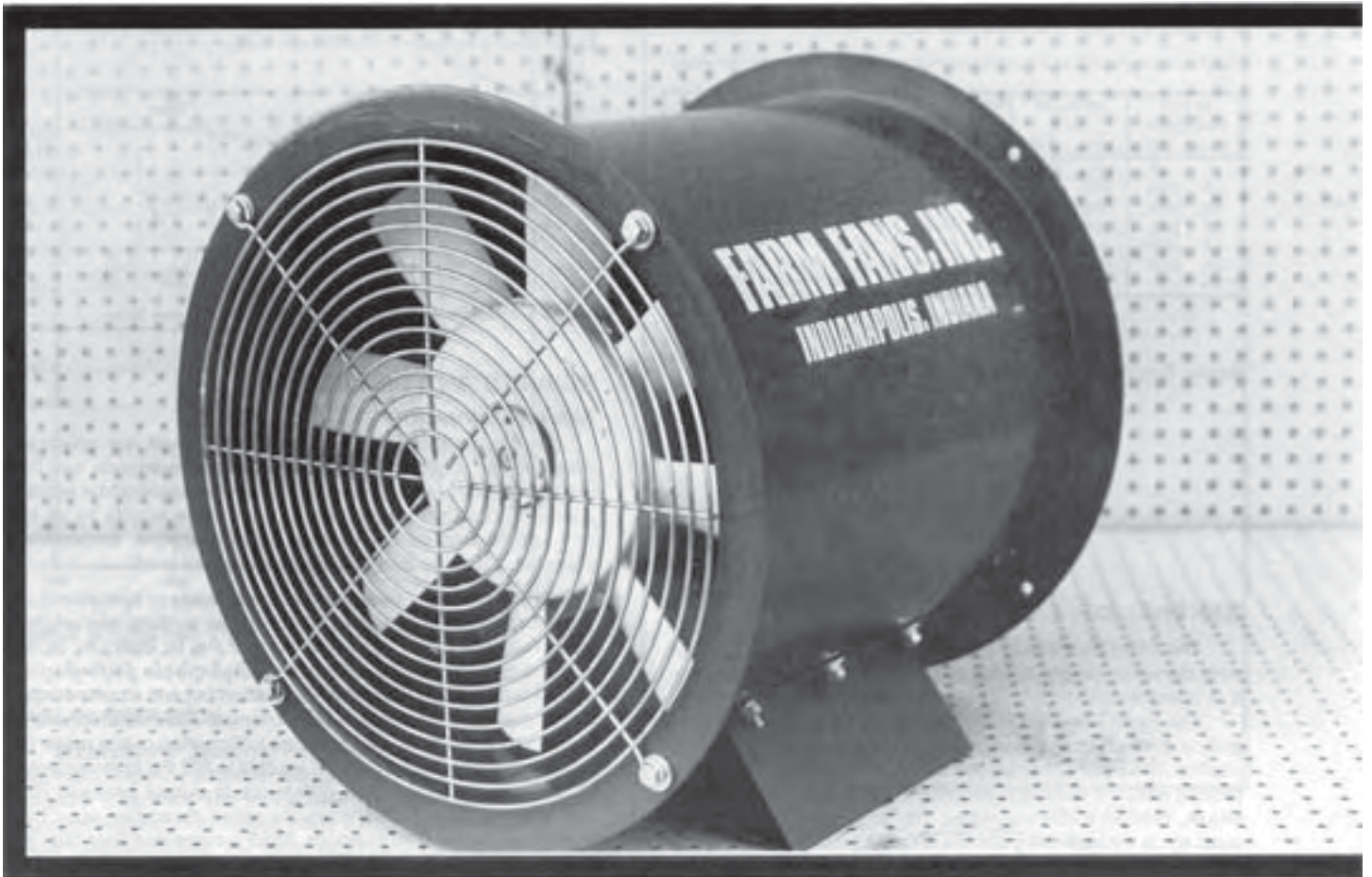


Evaluation Report

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Farm Fan Model 116AFG Tube Axial Aeration Fan

A Co-operative Program Between



FARM FAN MODEL 116AFG TUBE AXIAL AERATION FAN

MANUFACTURER:

Farm Fans, Inc.
5900 Elmwood Ave.
Indianapolis, Indiana 46203

DISTRIBUTOR:

Westeel-Rosco Limited
Box 792
Winnipeg, Manitoba
R3C 2N5

RETAIL PRICE:

\$483.00 (February 1984, f.o.b. Lethbridge, Alberta, complete with optional motor control assembly).

SUMMARY OF RESULTS

TABLE 1. Farm Fan Model 116AFG Performance at Typical Levels of Operation

Static Pressure		Airflow Rate		Input Power		Total Efficiency	Fan Speed
in wg	Pa	cfm	L/s	hp	W	%	rpm
0	0	4340	2050	2.11	1570	17	3536
0.5	124	3930	1860	2.26	1690	24	2527
1.0	249	3440	1620	2.40	1790	28	3519
1.5	374	2840	1340	2.44	1820	29	3513
2.0	495	2190	1030	2.40	1790	28	3512
2.5	623	1650	778	2.48	1850	25	3507
3.0	747	1460	689	2.57	1920	24	3504

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

GENERAL DESCRIPTION

The Farm Fan model 116AFG aeration fan is a 16 in (406 mm) diameter, single speed, direct drive, tube axial flow fan. It is primarily used for grain aeration or grain drying systems.

The Farm Fan 116AFG is equipped with a chromed guard grill, a duct mounting flange and a weather resistant switch control. The eight airfoil blades and hub are a single aluminium casting which is directly mounted on the 1.5 hp (1120 W), single phase, 115/230 V electric motor. The propeller is designed to push air up through the grain. By reversing the fan housing and the guard grill the fan is capable of drawing air down through the grain. The fan housing, motor mounts, flanges and mounting legs are of steel construction with an enamel coating for corrosion protection.

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

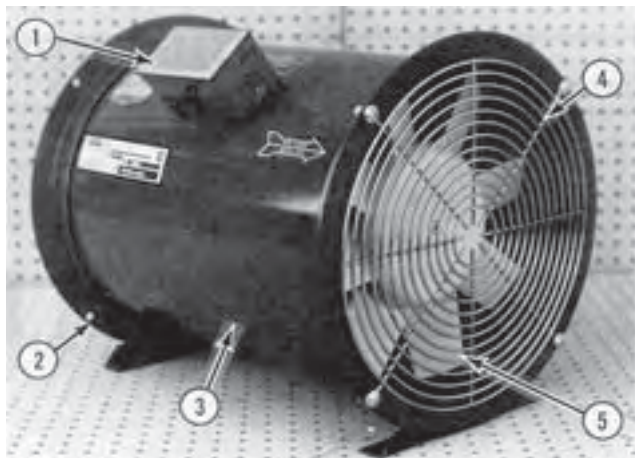


FIGURE 1. Farm Fan Model 116AFG Fan: (1) Switch Control, (2) Mounting Flange, (3) Fan Housing, (4) Guard Grill, (5) Propeller Blades.

SCOPE OF TEST

The Farm Fan model 116AFG fan was tested in the outlet 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.

Fan performance was determined at 230V. The fan was also evaluated for ease of operation, maintenance, operator safety and suitability of the operator's manual.

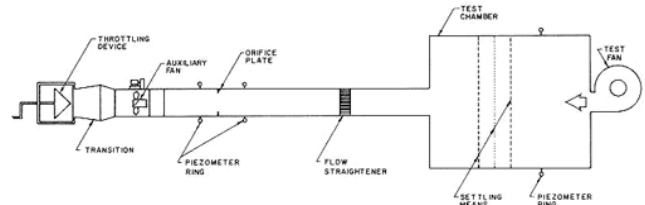


FIGURE 2. Schematic of Fan Test Apparatus - Outlet Chamber Setup.

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 at typical levels of operation (i.e. static pressure²) are given in TABLE 1. The air flow rate ranged from 1460 cfm (689 L/s) at 3 in wg (747 Pa) to 4340 cfm (2050 L/s) at 0 in wg (0 Pa). FIGURE 3 illustrates the fan performance curves for the Farm Fan 116AFG aeration fan and a comparison to the manufacturer's rated performance. The manufacturer's literature provided fan performance information over a range of static pressures from 1 to 3.5 in wg (249 to 872 Pa) in increments of 0.5 in wg (124 Pa). The difference in output between the manufacturer's and PAMI's results varied depending upon the level of operation. For example, PAMI's measured flow rate, at the peak efficiency of 29%, was 2900 cfm (1370 L/s) at a static pressure of 1.45 in wg (361 Pa). This was 13% lower than the manufacturer's rated output of 3350 cfm (1580 L/s) at a static pressure of 1.45 in wg (361 Pa).

Power Requirements: The power required to run the fan depended on the point of operation of the fan. The input power required varied from 2.57 hp (1920 W) at maximum static pressure and minimum air flow rate to 2.11 hp (1570 W) at zero static pressure and maximum air flow rate (free air flow). The motor was rated for a current draw of 9.2 amps with a service factor of 1.0. The motor operated within the rated amperage at static pressures up to 2.65 in wg (660 Pa). At higher static pressures, the maximum amperage drawn by the motor was 9.6 amps. Prolonged operation in excess of the rated amperage will 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) ranged from 17 to 29%. The maximum total efficiency of 29% occurred at 2900 cfm (1370 L/s) at a static pressure of 1.45 in wg (361 Pa).

EASE OF OPERATION

Maintenance: Seasonal inspection of the switch control box, motor mounts, propeller mounts, condition of the propeller, propeller clearance and motor bearings was required. Motor bearings required lubrication every 2 to 3 seasons or annually under continuous use. The removable guard grill allowed easy access for maintenance.

OPERATOR SAFETY

The guard grill provided adequate protection from the fan blades. The motor was a totally enclosed unit and presented no safety hazards. The Farm Fan 116AFG was CSA approved. The noise level³ of the Farm Fan 116AFG, while operating at a 1 in wg (249 Pa) static pressure, was 93 dB (A). Higher noise levels could be expected if the fan was operated in the vicinity of other

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

buildings. The Farm Fan 116AFG falls within range 4 of the PAMI noise level range classification (APPENDIX II). The noise level produced could damage hearing, depending on exposure time. Ear protection is definitely recommended.

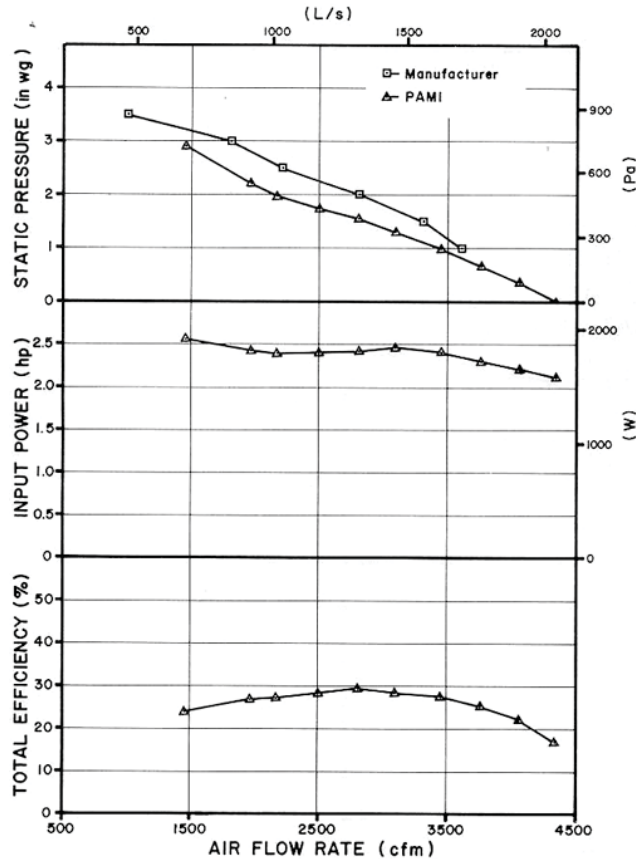


FIGURE 3. Farm Fan Model 116AFG Fan Performance Curves.

OPERATOR'S MANUAL

The operator's manual was very informative and contained detailed information on operation, specifications, installation, maintenance, rated performance, safety and trouble shooting. A detailed, well illustrated parts list was included. Also included with the fan was a general bulletin on grain bin drying and aeration systems which contained useful application and design information.

³PAMI Test Procedure for Determining Fan Noise Level.

APPENDIX I SPECIFICATIONS

MAKE: Farm Fan
MODEL: 116AFG-1/230
SERIAL NUMBER: 10556
MANUFACTURER: Farm Fans, Inc.
 5900 Elmwood Ave.
 Indianapolis, Indiana 46203

OVERALL DIMENSIONS:

- housing width 19 in (483 mm)
- housing height 19.4 in (492 mm)
- housing length 18 in (457 mm)
- inside tube diameter 16.2 in (413 mm)
- guard grill diameter 16.5 in (419 mm)
- grill opening 0.125 in (3 mm) diameter spaced at 0.5 in (13 mm) in a circular pattern.

PROPELLER:

- diameter 16 in (406 mm)
- hub diameter 7.75 in (197 mm)
- number of blades 8
- blade angle 29 degrees

WEIGHT:

71 lb (32 kg)

MOTOR NAMEPLATE DATA:

- make Leeson
- model CGC34NB6A
- frame F56
- class B
- type CN
- duty continuous-air over
- rpm 3450
- service factor 1
- ambient temperature rise 40°C
- volts 115/230
- amps 18.4/9.2
- phase 1
- cycles 60 Hz
- horsepower 1.5 hp (1120 W)

APPENDIX II NOISE LEVEL RANGES

Range	(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 FARM FAN 116AFG TUBE AXIAL AERATION FAN

RETAIL PRICE: \$483.00 (February, 1984, f.o.b. Lethbridge)
FAN DESCRIPTION: 16 in (406 mm) single speed, direct drive, 1.5 hp (1120 W) electric motor
FAN SPEED: 3504 to 3536 rpm
MAXIMUM EFFICIENCY: 29%
AIR FLOW RATE:
 --range 1460 to 4340 cfm (689 to 2050 L/s)
 --at maximum efficiency 2900 cfm (1370 L/s) at a 1.45 in wg (361 Pa) static pressure
INPUT POWER: 2.11 to 2.57 hp (1570 to 1920 W)
OPERATOR SAFETY: guard grill provided CSA approved noise level = 93 dB(A)
OPERATOR'S MANUAL: complete and very informative



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