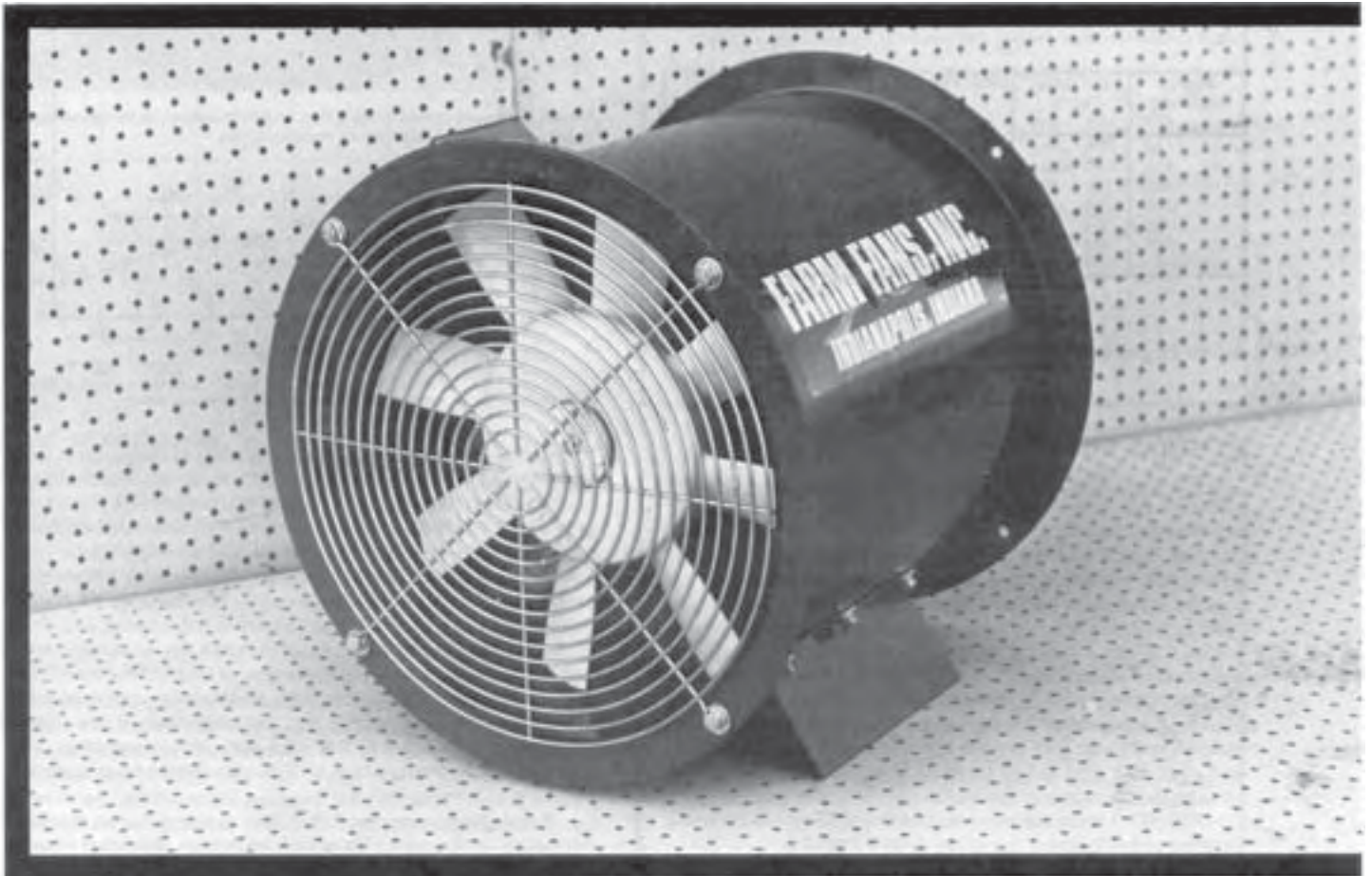


Evaluation Report

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Farm Fan Model 114SHG Tube Axial Aeration Fan

A Co-operative Program Between



FARM FAN MODEL 114SHG TUBE AXIAL AERATION FAN

MANUFACTURER AND DISTRIBUTOR:

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

DISTRIBUTOR:

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

RETAIL PRICE:

\$399.00 (February 1984, f.o.b. Lethbridge, Alberta, complete with motor switch control).

SUMMARY OF RESULTS

TABLE 1. Farm Fan Model 114SHG 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	2570	1210	1.06	791	11	3547
0.5	124	2300	1080	1.18	879	21	3534
1.0	249	1840	870	1.27	944	25	3525
1.5	374	1230	580	1.34	1000	21	3516
2.0	495	895	422	1.44	1070	18	3505
2.5	623	554	261	1.56	1160	13	3491
3.0	747	255	106	1.61	1200	6	3488

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

GENERAL DESCRIPTION

The Farm Fan model 114SHG aeration fan is a 14 in (356 mm) diameter single speed, direct drive, tube axial flow fan. It is primarily used for grain aeration or grain drying systems.

The Farm Fan 114SHG 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 hp (746 W), single phase, 115/230 V electric motor. The propeller is designed to pull air down and out of a grain bin rather than the more common method of forcing air up through the grain. The fan is capable of being used for both directions of airflow by reversing the fan housing and guard grill. 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.

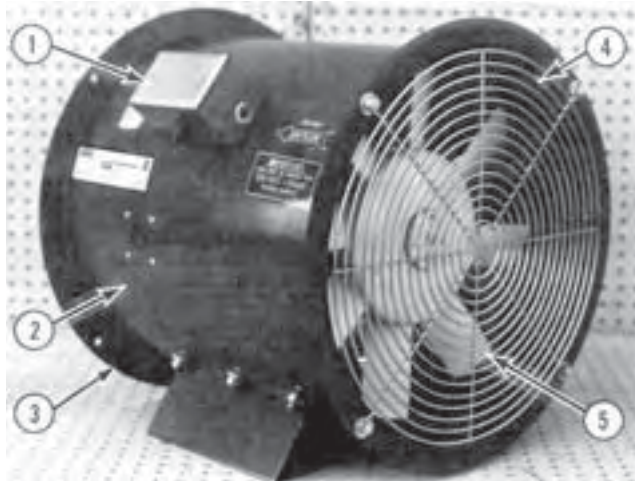


FIGURE 1. Farm Fan Model 114SHG Fan: (1) Switch Control, (2) Fan Housing, (3) Mounting Flange, (4) Guard Grill, (5) Propeller Blades.

SCOPE OF TEST

The Farm Fan model 114SHG 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 airflow rate, static pressure, input power and total efficiency.

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

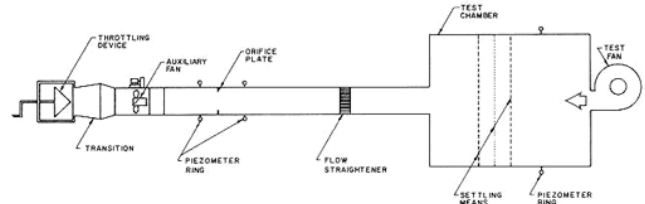


FIGURE 2. Schematic of Fan Test Apparatus Inlet Chamber Setup.

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 at typical levels of operation (i.e. static pressure²) are given in TABLE 1. The airflow rate ranges from 225 cfm (106 L/s) at 3 in wg (747 Pa) to 2570 cfm (1210 L/s) at 0 in wg (0 Pa). FIGURE 3 illustrates the fan performance curves for the Farm Fan 114SHG 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 in (25 to 75 mm) in increments of 0.5 in (12.5 mm). The difference in output between the manufacturer's and PAMI's results was more apparent at higher flow rates (i.e. lower static pressures). For example, PAMI's measured flow rate, at the peak efficiency of 25%, was 1840 cfm (870 L/s) at a static pressure of 1 in wg (249 Pa). This was 26% lower than the manufacturer's rated output of 2500 cfm (1180 L/s) at a static pressure of 1 in wg (249 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 1.61 hp (1200 W) at maximum static pressure and minimum air flowrate to 1.06 hp (791 W) at zero static pressure and maximum air flowrate (free air flow). The maximum amperage drawn by the motor was 7 amps, which was within the rated motor amperage of 6.7 amps with a service factor of 1.25. 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 airflow rate and corresponding total pressure. For typical levels of operation, the total efficiency (TABLE 1) ranged from 6 to 25%. The maximum total efficiency of 25% occurred at 1840 cfm (870 L/s) at a static pressure of 1 in wg (249 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 114SHG was CSA approved.

The noise level³ of the Farm Fan 114SHG, while operating at a 1 in wg (249 Pa) static pressure, was 80 dB (A). Higher noise levels could be expected if the fan was operated in the vicinity of

¹Standard air is air with a density of 0.075 lb/ft³ (12 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).

other buildings. The Farm Fan 114SHG falls within range 3 of the PAMI noise level range classification (APPENDIX II). The noise level produced could 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.

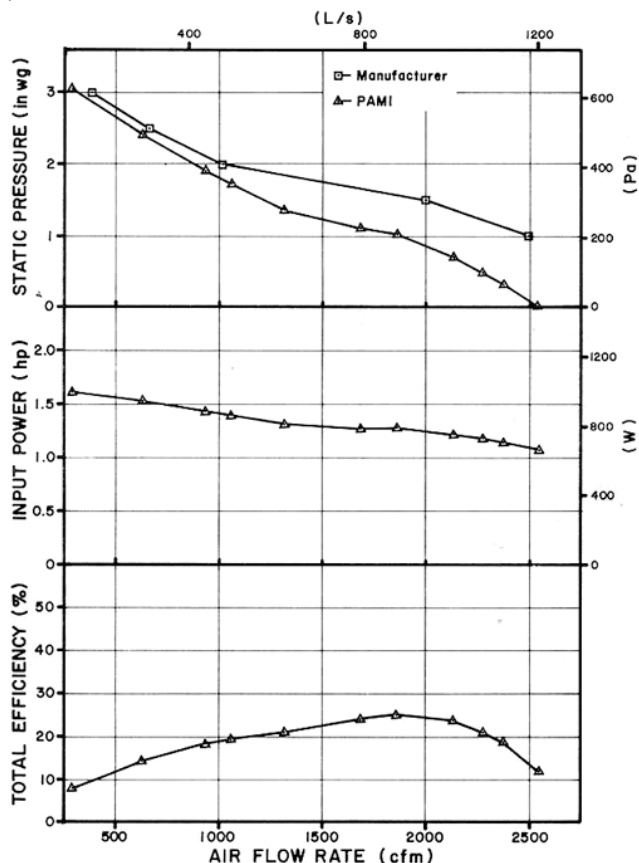


FIGURE 3. Farm Fan Model 114SHG Fan Performance Curves.

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:	114SHG-11230
SERIAL NUMBER:	1684G
MANUFACTURER:	Farm Fans, Inc. 5900 Elmwood Ave. Indianapolis, Indiana 46203

OVERALL DIMENSIONS:

- housing width 16.5 in (419 mm)
- housing height 16.6 in (422 mm)
- housing length 18.1 in (460 mm)
- inside tube diameter 14.1 in (358 mm)
- guard grill diameter 14.5 in (368 mm)
- grill opening 0.125 in (3 mm) diameter spaced at 0.5 in (13 mm) in a circular pattern.

PROPELLER:

- diameter 13.9 in (352 mm)
- hub diameter 7 in (178 mm)
- number of blades 8
- blade angle 23 degrees

WEIGHT:

64 lb (29 kg)

MOTOR NAMEPLATE DATA:

- make Baldor
- model 34-2404-1256
- frame 56
- class B
- duty continuous
- rpm 3450
- service factor 1.25
- ambient temperature rise 40°C
- power factor 68%
- volts 115/230
- amps 13.4/6.7
- phase 1
- cycles 60
- hp 1 hp (746 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 114SHG TUBE AXIAL AERATION FAN

RETAIL PRICE:	\$399.00 (February, 1984. f.o.b. Lethbridge)
FAN DESCRIPTION:	14 in (356 mm) single speed, direct drive. 1 hp (746 W) electric motor
FAN SPEED:	3488 to 3547 rpm
MAXIMUM EFFICIENCY:	25%
AIR FLOW RATE:	- range 225 to 2570 cfm (106 to 1210 L/s) - at maximum efficiency 1240 cfm (870 L/s) at a 1 in wg (249 Pa) static pressure
INPUT POWER:	1.06 to 1.61 hp (791 to 1200 W)
OPERATOR SAFETY:	guard grill provided CSA approved noise level = 80 dB(A)
OPERATOR'S MANUAL:	complete and very informative



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