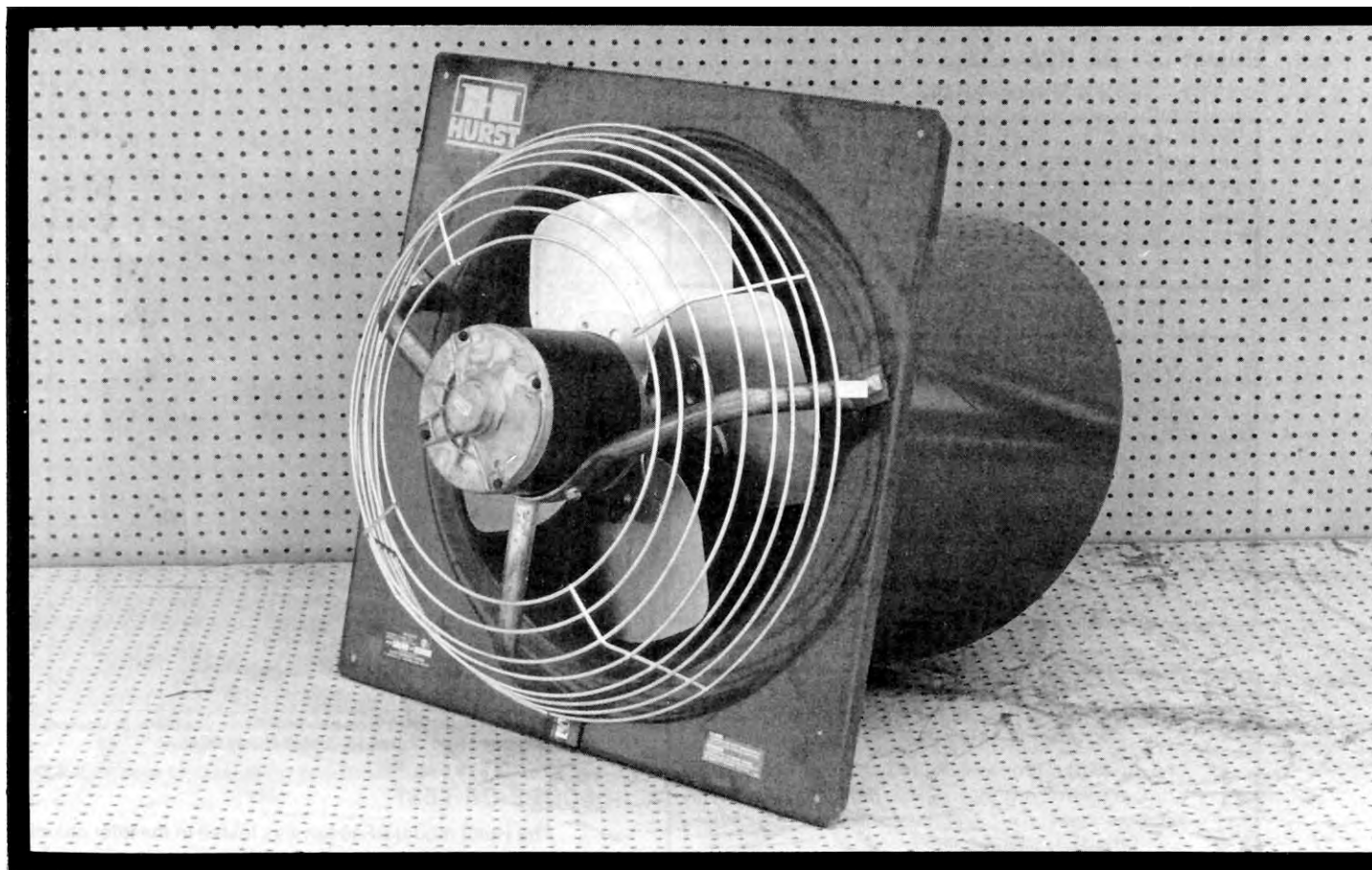


Evaluation Report

431



Hurst Model BF-18 Ventilation Fan

A Co-operative Program Between



ALBERTA
FARM
MACHINERY
RESEARCH
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

HURST MODEL BF-18 VENTILATION FAN

MANUFACTURER:

Hurst Equipment Ltd.
75 Archibald St.
Winnipeg, Manitoba
R2J 0VT

DISTRIBUTOR:

1. U.F.A. Co-op Limited -- Calgary, Alta.
2. Eastman Feeds -- Lethbridge, Alta.
-- Winnipeg, Man.
3. Feed Rite Limited -- Linden, Alta.
-- Humboldt, Sask.
-- Winnipeg, Man.
4. Prairie Poultry and Dairy Service -- Regina, Sask.
5. Western Feed Mills -- Regina, Sask.

RETAIL PRICE:

\$348.35 (June, 1985, f.o.b. Lethbridge, Alberta).

SUMMARY OF RESULTS

TABLE 1. Hurst Model BF-18 Fan Performance at Typical Levels of Operation.

SETTING	STATIC PRESSURE in wg (Pa)		AIR FLOW RATE cfm L/s)	POWER CONSUMPTION kWh	TOTAL EFFICIENCY %	FAN SPEED rpm
Single Speed	0.0	(0.0)	3540 (1670)	0.414	21	1727
	0.05	(12.5)	3440 (1620)	0.433	23	1722
	0.10	(24.9)	3340 (1580)	0.449	25	1718
	0.125	(31.1)	3280 (1550)	0.458	26	1715
	0.25	(62.3)	3030 (1430)	0.497	29	1703

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying a detailed operator's manual containing illustrations and information on general operation, installation, maintenance, rated performance, safety aspects and trouble shooting.

Senior Engineer: E. H. Wiens

Project Engineer: R. P. Atkins

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We are in the process of producing an operator's manual (pamphlet) that will be included with each fan that is sold. Our deadline for completion of the pamphlet is November, 1985.

GENERAL DESCRIPTION

The Hurst model BF-18 ventilation fan is a 18.5 in (470 mm) diameter single 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 Hurst model BF-18 is a flush mounted unit equipped with an inlet guard grill, butterfly outlet shutters, and a single speed Honeywell model T631-A control. A variable speed motor and two speed motor complete with controls are available as options but were not supplied with the fan. The 4 blade propeller and hub are made of stainless steel and are mounted directly on the 1/3 hp (249 W), single phase, 115 V electric motor. The motor mount consists of a stainless steel cage. The galvanized sheet metal housing and butterfly shutters are painted for corrosion protection.

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

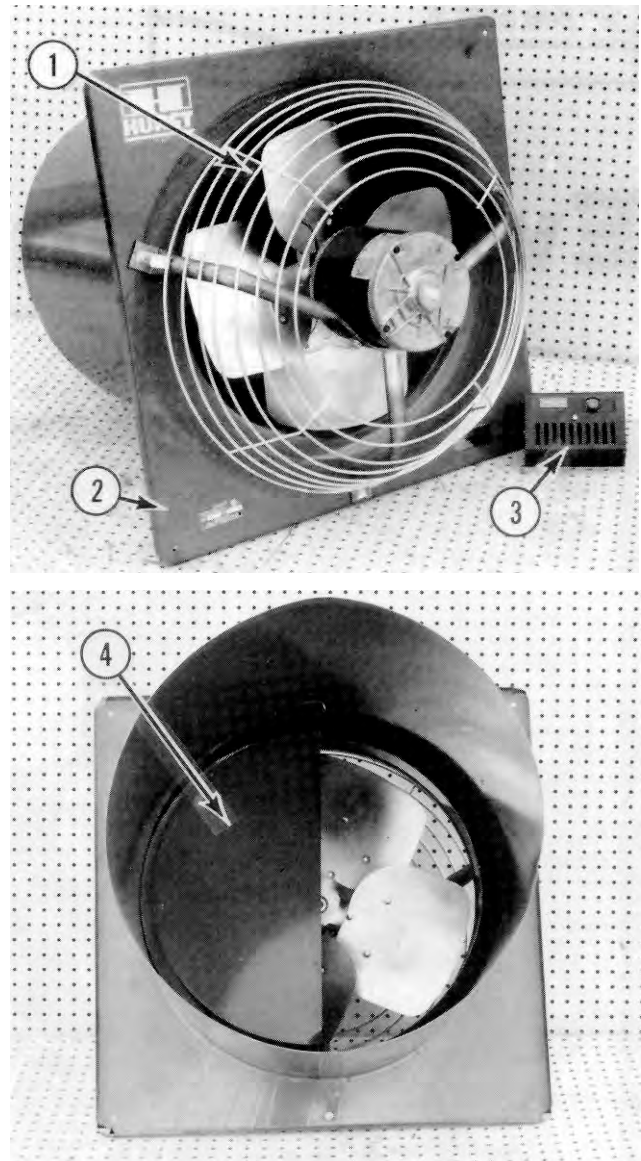


FIGURE 1. Hurst Model BF-18 Ventilation Fan: (1) Inlet Guard Grill, (2) Mounting Face Plate, (3) Single Speed Control, (4) Outlet Butterfly Shutters.

SCOPE OF TEST

The Hurst model BF-18 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 air flow rate, static pressure, input power and total efficiency. The butterfly shutters were standard equipment and an integral part of the fan unit, so all tests were performed with the shutters in place.

Fan performance was determined at 115V with the single speed control.

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

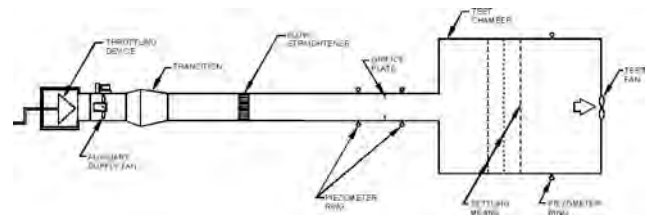


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

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: Air flow rates at typical levels of operation (i.e. static pressure²) 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 manufacturer's rated air flow rate at 0.125 in wg (31.1 Pa), in the single speed mode, was 3700 cfm (1750 L/s). PAMI's measured flow rate at the same conditions was 3280 cfm (1550 L/s) or 11% lower than the manufacturer's rating.

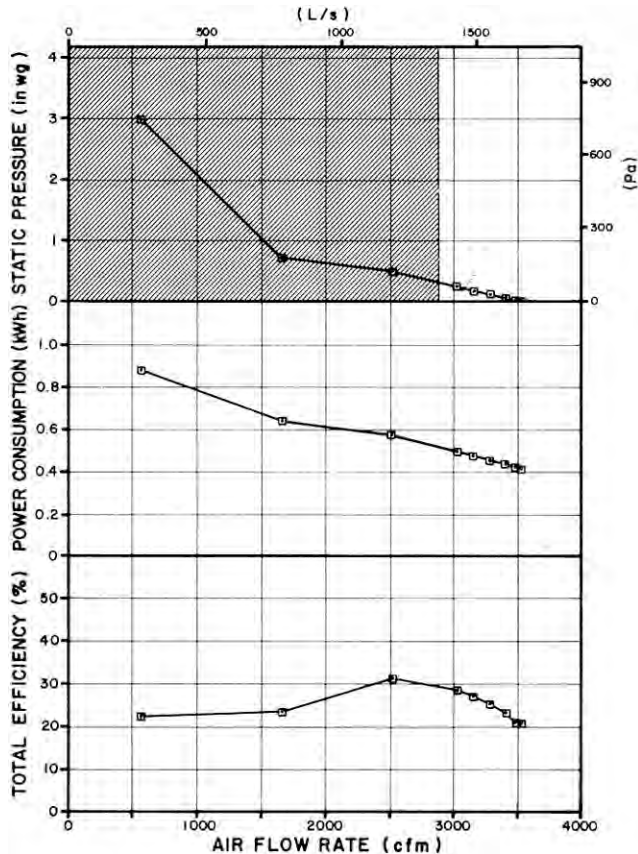


FIGURE 3. Hurst Model BF-18 Fan Performance Curves in the Single Speed Mode.

Power Consumption: Power consumption is the amount of energy (kWh) used by the fan motor. These numbers can be used directly to determine fan operating costs. For typical levels of static pressure (TABLE 1), the power consumption varied from 0.414 to 0.497 kWh at the single speed setting. The maximum amperage drawn by the motor was 8.4 amps, which was greater than the rated motor amperage of 6.0 amps. The shaded zone in FIGURE 3 illustrates the point of operation at which the rated amperage was exceeded. Motor amperage was not exceeded at static pressures below 0.30 in wg (76 Pa). Ventilation fans are not normally operated at static pressures higher than this. Prolonged operation in excess of the 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) ranged from 21 to 29% for the single speed setting. The total efficiency at maximum fan speed and a static pressure of 0.125 in wg (31.1 Pa) was 26%.

EASE OF OPERATION

Maintenance: The inlet guard grill was easily removed. This made for easy access for cleaning the housing and fan blades. 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 model BF-18 was CSA approved.

The noise level of the model BF-18, at a distance of 4.9 ft (1.5 m) from the centre of the fan discharge, 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 model BF-18 falls within range 3 of the PAMI 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

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

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).

APPENDIX I

SPECIFICATIONS

MAKE: Hurst

MODEL: BF-18

SERIAL NUMBER: A-01-85

MANUFACTURER: Hurst Equipment Ltd.
75 Archibald St.
Winnipeg, Man.
R2J 0V7

OVERALL DIMENSIONS:

- housing and flange width 27.0 in (686 mm)
- housing and flange height 27.0 in (686 mm)
- housing depth at bottom (motor included) 25.8 in (655 mm)
- housing depth at top (motor included) 32.6 in (829 mm)
- housing diameter 21.2 in (538 mm)
- guard grill diameter 24.0 in (610 mm)
- grill opening 0.19 in (5 mm) diameter wire spaced at 0.75 to 3.75 in (19 to 95 mm) in a circular pattern

IMPELLER:

- diameter 18.5 in (470 mm)
- number of blades 4
- blade angle 21 degrees

WEIGHT: 57 lb (17 kg)

MOTOR NAMEPLATE DATA:

- make CGE
- model 5J603YAX
- frame 42
- class B
- type KH
- duty air over
- rpm 1725
- ambient temperature rise 40°C
- volts 115 V
- amps 6.0 A
- phase single
- cycles 60 Hz
- horsepower 1/3 hp (249 W)

APPENDIX III

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)

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

HURST MODEL BF-18 VENTILATION FAN

RETAIL PRICE: \$348.35
(June, 1985, f.o.b. Lethbridge)

FAN DESCRIPTION
18.5 in (470 mm) propeller fan, single speed, direct drive, 1/3 hp (249 W) 115 V electric motor.

FAN SPEED:
- single speed 1703 to 1727 rpm

EFFICIENCY RANGE: 21 to 29%

EFFICIENCY AT 0.125 in wg (31.1 Pa): 26%

AIR FLOW RATE:
- range 3030 to 3540 cfm (1430 to 1670 L/s)
- at 0.125 in wg (31.1 Pa) 3280 cfm (1550 L/s)

POWER CONSUMPTION: 0.414 to 0.497 kWh

OPERATOR SAFETY: inlet guard grill provided
CSA approved
noise level -- 80 dB(A) at 4.9 ft (1.5 m) from fan discharge

OPERATOR'S MANUAL: 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