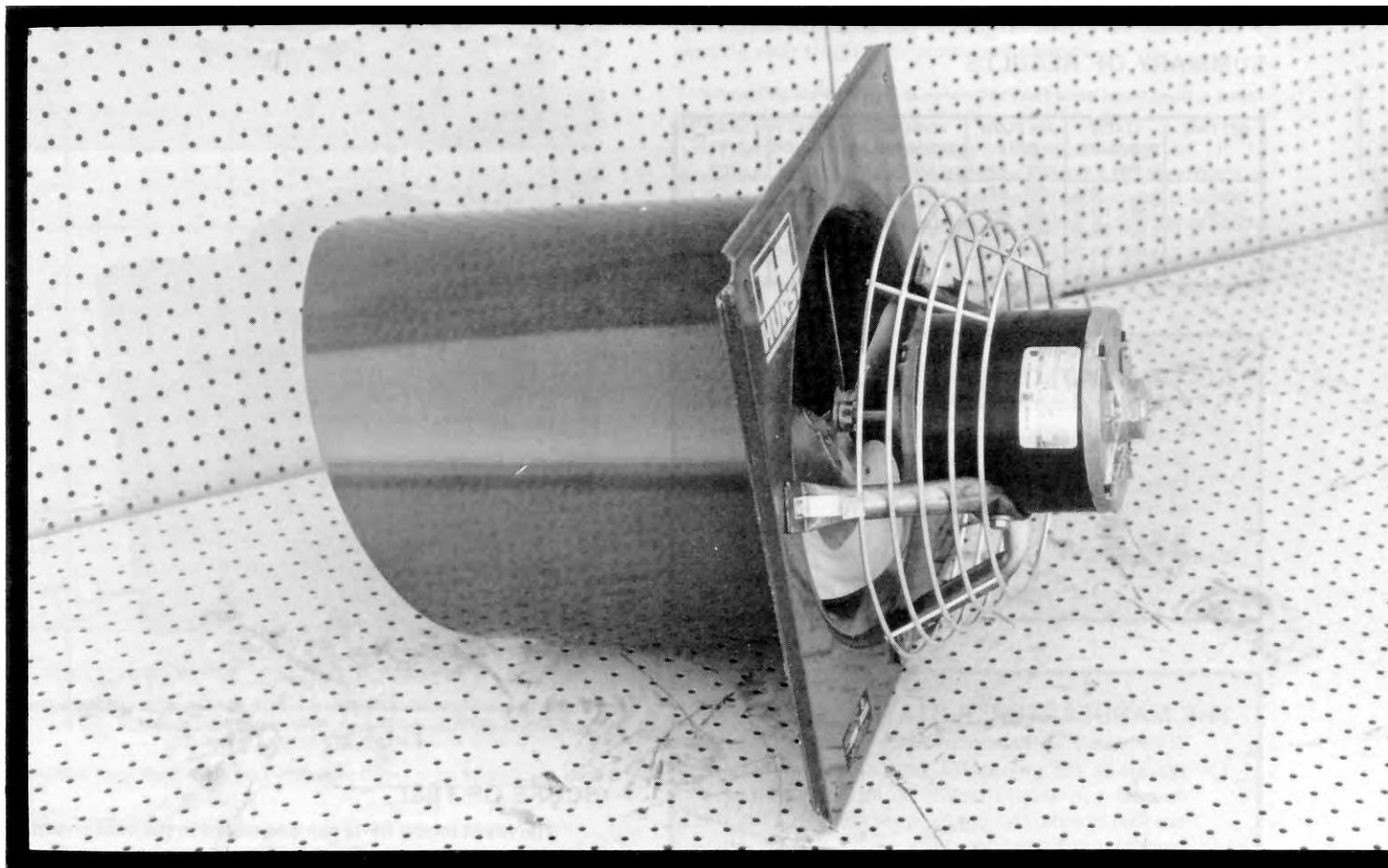


# Evaluation Report

# 430



## Hurst Model BF-12 Ventilation Fan

A Co-operative Program Between



ALBERTA  
FARM  
MACHINERY  
RESEARCH  
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

# HURST MODEL BF-12 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:

\$256.10 (June, 1985, f.o.b. Lethbridge, Alberta).

## SUMMARY OF RESULTS

TABLE 1. Hurst Model BF-12 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)	1190 (562)	0.156	10	1778
	0.05 (12.5)	1160 (548)	0.163	13	1776
	0.10 (24.9)	1090 (514)	0.169	15	1773
	0.125 (31.1)	1050 (495)	0.172	15	1772
	0.25 (62.3)	783 (369)	0.178	14	1769

## 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-12 ventilation fan is a 12 in (305 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-12 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 1/4 hp (187 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.

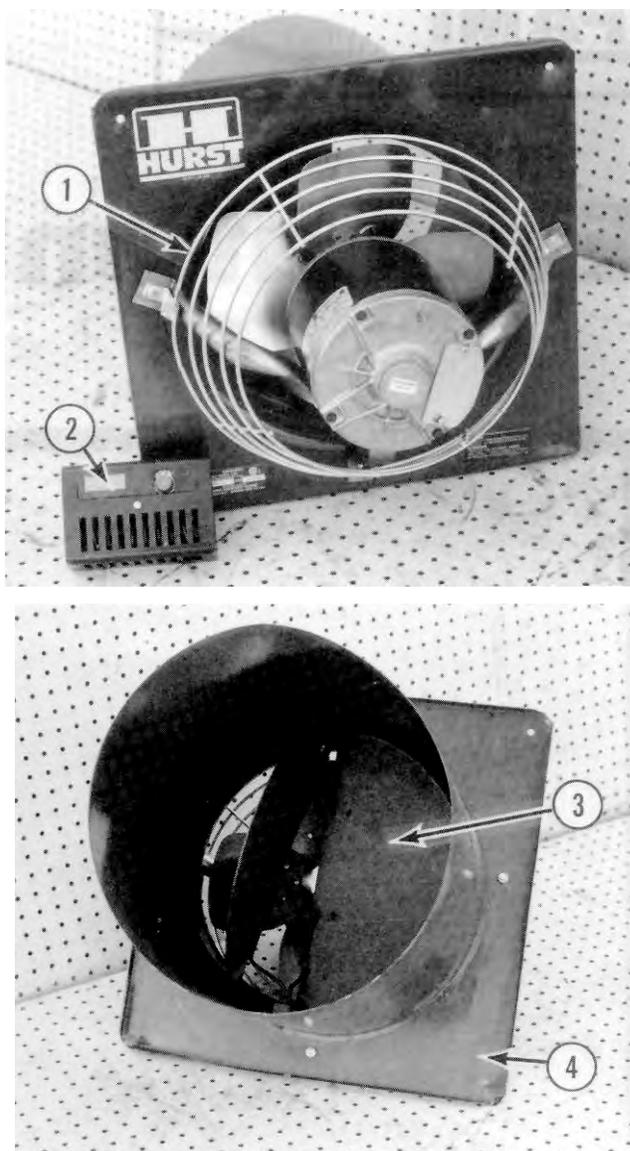


FIGURE 1. Hurst Model BF-12 Ventilation Fan: (1) Inlet Guard Grill, (2) Single Speed Control, (3) Outlet Butterfly Shutters, (4) Mounting Face Plate.

## SCOPE OF TEST

The Hurst model BF-12 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.

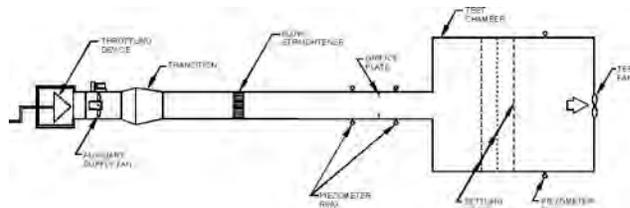


FIGURE 2. Schematic of Fan Test Apparatus - Inlet Chamber Setup.

## RESULTS AND DISCUSSION

### FAN PERFORMANCE

All fan performance results in this report are given at standard 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:** Air flow rates at typical levels of operation (i.e. static pressure<sup>2</sup>) 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 1075 cfm (507 L/s). PAMI's measured flow rate at the same conditions was 1050 cfm (495 L/s) or 2% lower than the manufacturer's rating.

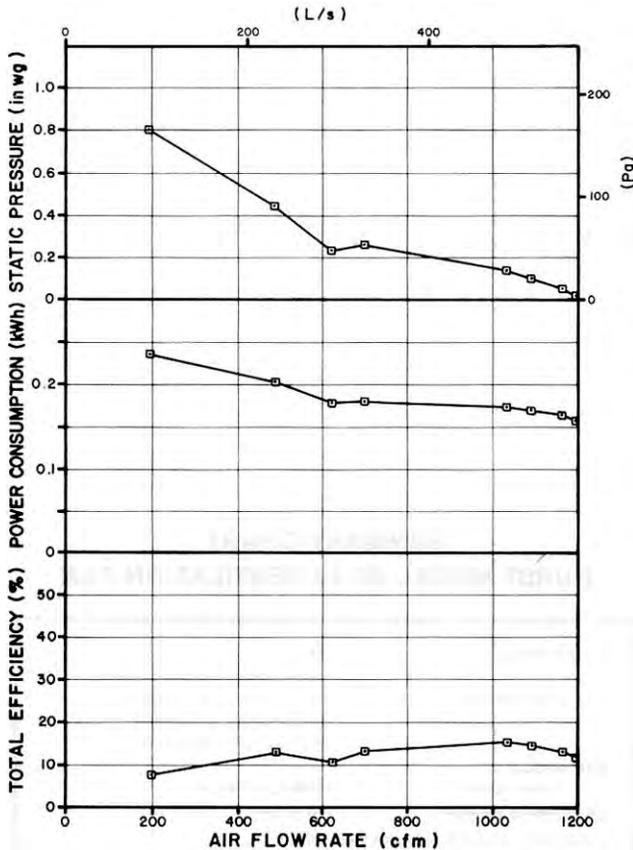


FIGURE 3. Hurst Model BF-12 Fan Performance Curves in the Single Speed Mode.

**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 0.156 to 0.178 kWh at the single speed setting. The maximum amperage drawn by the motor was 3.5 amps, which was less than the rated motor amperage of 4.3 amps.

**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 10 to 15% for the single speed operation. The total efficiency at a static pressure of 0.125 in wg (31.1 Pa) was 15%.

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

### 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-12 was CSA approved.

The noise level of the model BF-12, 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 73 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The model BF-12 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.

**APPENDIX I**

**SPECIFICATIONS**

**MAKE:** Hurst

**MODEL:** BF-12

**SERIAL NUMBER:** A-02-85

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

**OVERALL DIMENSIONS:**

- housing and flange width 19.1 in (486 mm)
- housing and flange height 19.1 in (486 mm)
- housing depth at bottom (motor included) 21.3 in (540 mm)
- housing depth at top (motor included) 26.9 in (683 mm)
- housing diameter 14.6 in (371 mm)
- guard grill diameter 15.5 in (394 mm)
- grill opening 0.19 in (5 mm) diameter wire spaced at 0.75 to 2.75 in (19 to 70 mm) in a circular pattern

**IMPELLER:**

- diameter 12.1 in (308 mm)
- number of blades 4
- blade angle 24 degrees

**WEIGHT:** 37 lb (17 kg)

**MOTOR NAMEPLATE DATA:**

- make CGE
- model 5J602YAX
- frame 42
- class B
- type KH
- duty air over
- rpm 1725
- ambient temperature rise 40°C
- volts 115 V
- amps 4.3A
- phase single
- cycles 60 Hz
- horsepower 1/4 hp (187 W)

**APPENDIX III**

cubic feet/minute (cfm) x 0.472 = litres/second (L/s)  
 horsepower (hp) x 745.7 = watts (W)  
 inches (in) x25.4 = 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-12 VENTILATION FAN**

**RETAIL PRICE:** \$256.10  
(June, 1985, f.o.b. Lethbridge)

**FAN DESCRIPTION** 12.1 in (308 mm) propeller fan, single speed, direct drive, 1/4 hp (187 W) 115 V electric motor.

**FAN SPEED:**  
- single speed 1769 to 1778 rpm

**EFFICIENCY RANGE:** 10 to 15%

**EFFICIENCY AT 0.125 in wg (31.1 Pa):** 15%

**AIR FLOW RATE:**  
- range 783 to 1190 cfm (369 to 562 L/s)  
- at 0.125 in wg (31.1 Pa) 1050 cfm (495 L/s)

**POWER CONSUMPTION:** 0.156 to 0.178 kWh

**OPERATOR SAFETY:** inlet guard grill provided  
CSA approved  
noise level = 73 dB(A) at 4.9 ft (1.5 m) from fan discharge

**OPERATOR'S MANUAL:** None supplied



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