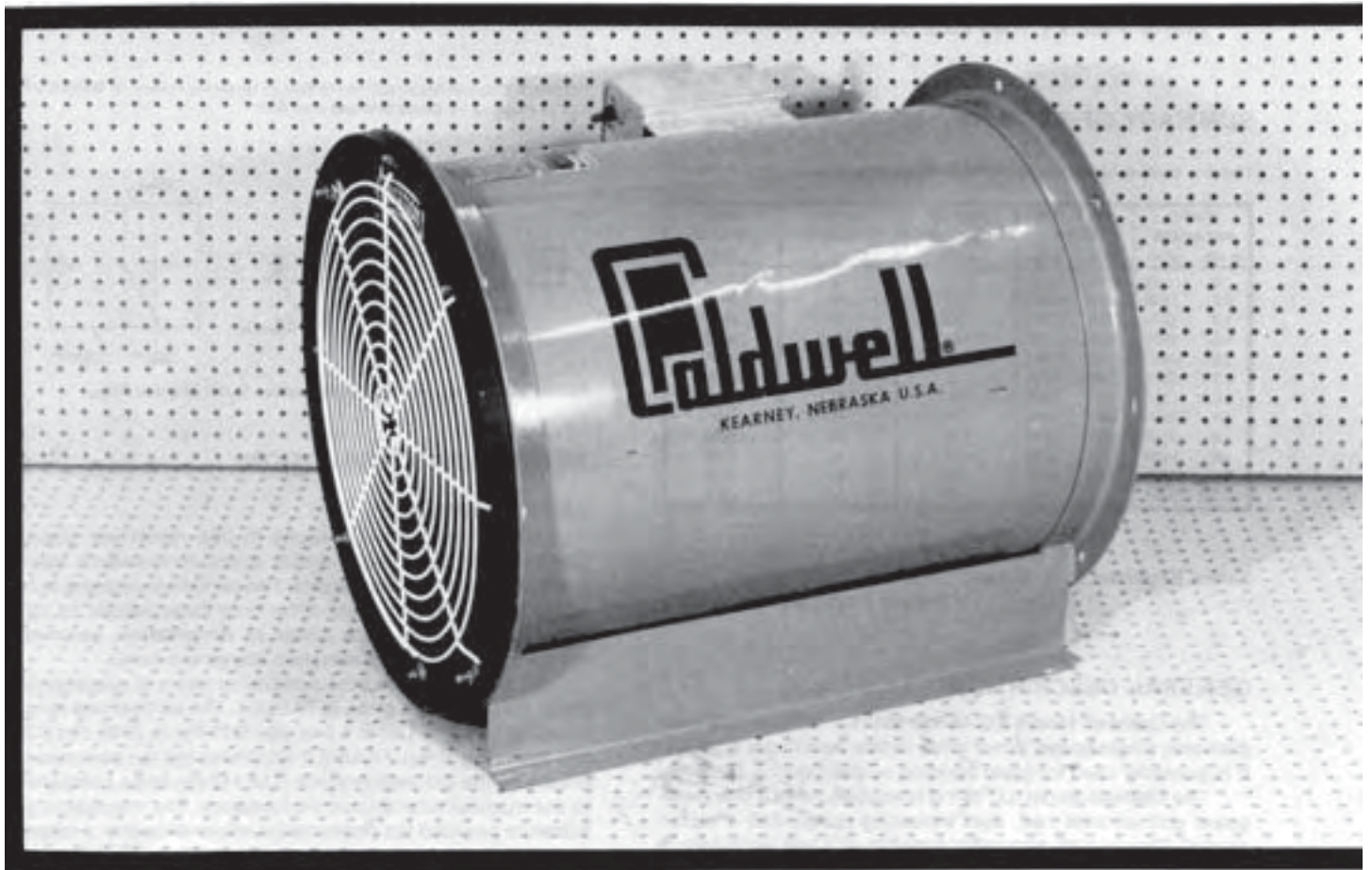


# Evaluation Report

# 413



## Caldwell Model ILC 18-112 In. Line Centrifugal Fan

A Co-operative Program Between



# CALDWELL MODEL ILC 18-112 IN-LINE CENTRIFUGAL FAN

## MANUFACTURER:

Caldwell Manufacturing Company  
 A Division of Chief Industries Inc.  
 P. O. Box 338  
 Kearney, Nebraska 68847-0338

## DISTRIBUTORS:

1. Westland Metals - Edmonton, Alberta  
Saskatoon, Sask.  
Regina, Sask.
2. Frank Flaman - Edmonton, Alberta  
Saskatoon, Sask.  
Prince Albert, Sask.  
Southey, Sask.
3. Denouden Agri- Regina, Sask.
4. Wall Grain Handling - Brandon, Man.

## RETAIL PRICE:

\$895.00 (February, 1985, f.o.b. Lethbridge, Alberta)

## SUMMARY OF RESULTS

TABLE 1. Caldwell Model ILC 18-112 Performance at Typical Levels of Operation

Static Pressure		Air Flow Rate		Power Consumption	Total Efficiency	Fan Speed
in wg	(Pa)	cfm	(L/s)	kWh	%	rpm
0	(0)	2700	(1270)	1.34	6	3519
0.5	(125)	2620	(1240)	1.39	14	3514
1.0	(249)	2530	(1190)	1.45	21	3509
1.5	(374)	2410	(1140)	1.54	30	3502
2.0	(497)	2280	(1080)	1.62	36	3494
2.5	(623)	2180	(1030)	1.68	40	3488
3.0	(747)	2080	(981)	1.73	43	3484
3.5	(872)	1970	(932)	1.76	45	3481
4.0	(996)	1820	(857)	1.80	47	3478
4.5	(1120)	1540	(730)	1.79	46	3482
5.0	(1240)	1070	(507)	1.58	40	3505
5.5	(1370)	240	(113)	1.11	14	3539

Senior Engineer: E. H. Wiens  
 Project Engineer: R. P. Atkins

## GENERAL DESCRIPTION

The Caldwell Model ILC 18-112 fan is a 12.75 in (324 mm) diameter, single speed, direct drive, in-line centrifugal flow fan. It is primarily used for grain aeration or grain drying systems.

The Caldwell Model ILC 18-112 is equipped with a wire mesh guard grill an inlet bell, duct mounting flange and a motor control. The aluminium impeller consists of a hub backplate, 9 backward curved blades and a flange. The impeller is directly mounted on the 1.5 hp (1120 W), single phase, 230 V electric motor. The fan housing, motor mounts, straightening vanes, inlet bell, flanges and mounting legs are of steel construction with an enamel finish for corrosion protection. The motor control enclosure is made of galvalume material.

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

## SCOPE OF TEST

The Caldwell Model ILC 18-112 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.

## 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.

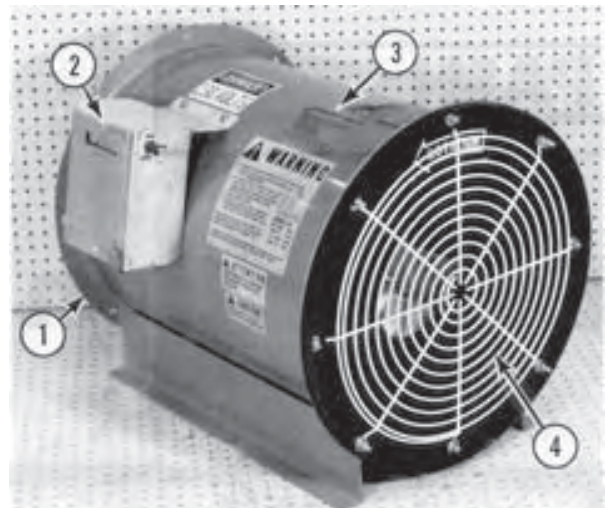


FIGURE 1. Caldwell Model ILC 18-112 Fan: (1) Mounting Flange, (2) Motor Control, (3) Fan Housing, (4) Guard Grill and Inlet Bell.

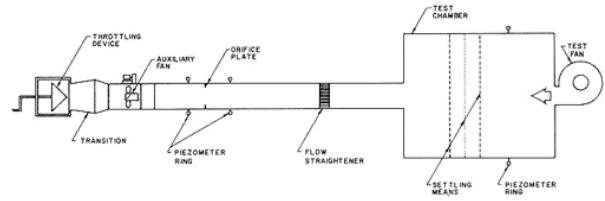


FIGURE 2. Schematic of Fan Test Apparatus - Outlet Chamber Setup.

**Air Flow Rate:** Fan output at typical levels of operation (i.e. static pressure<sup>2</sup>) are given in TABLE 1. The air flow rate ranged from 240 cfm (113 L/s) at 5.5 in wg (1370 Pa) to 2700 cfm (1270 L/s) at 0 in wg (0 Pa). FIGURE 3 illustrates the fan performance curves for the Caldwell model ILC 18-112 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 0 to 5.5 in wg (0 to 1120 Pa). The difference in output depended upon the level of operation. For example, PAMI's measured air flow rate at peak efficiency of 47% was 1710 cfm (807 L/s) at a static pressure of 4.2 in wg (1050 Pa). This was 4% lower than the manufacturer's rated output of 1780 cfm (840 L/s) at a static pressure of 4.2 in wg (1040 Pa).

**Power Consumption:** Power consumption is the amount of energy (kWh) used by the fan motor. The power consumed by the fan depended upon the point of operation of the fan. The power consumption varied from 1.11 kWh at maximum static pressure and minimum air flow rate to 1.80 kWh at 4 in wg (996 Pa) static pressure and an air flow rate of 1820 cfm (857 L/s).

The maximum amperage drawn by the motor was 7.1 amps, which was lower than the maximum rated motor amperage of 7.6 amps for "air over" motor duty.

**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 6 to 47%. The maximum total efficiency of 47% occurred at 1710 cfm (807 L/s) at a static pressure of 4.2 in wg (1050 Pa).

## EASE OF OPERATION

**Maintenance:** Seasonal inspection of the switch control box, motor mounts, impeller and fan motor was required. Seasonal lubrication of the motor was required. During the off season, operation of the fan for 30 minutes every three weeks was required to ensure bearing lubrication.

<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).

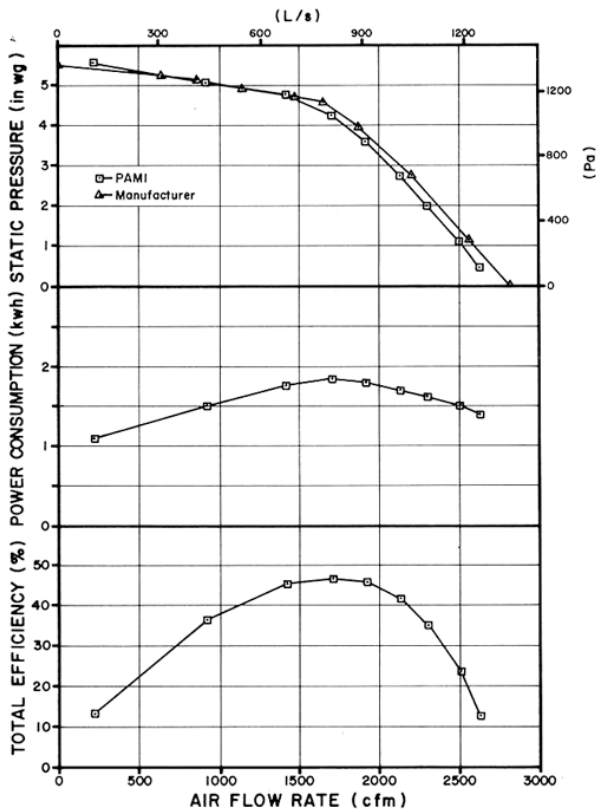


FIGURE 3. Caldwell Model ILC 18-112 Fan Performance Curves.

#### 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 Caldwell ILC 18-112 was CSA approved.

The noise level of the Caldwell ILC 18-112, at a distance of 4.9 ft (1.5 m) from the centre of the fan inlet, while operating at a 1 in wg (249 Pa) static pressure, was 78 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Caldwell ILC 18-112 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 blower for prolonged periods.

#### OPERATOR'S MANUAL

The operator's manual was very informative and contained detailed illustrations and information on operation, specifications, installations, wiring, maintenance, safety, performance, service and trouble shooting.

#### APPENDIX I SPECIFICATIONS

**MAKE:** Caldwell  
**MODEL:** ILC 18-112  
**SERIAL NUMBER:** 84J211  
**MANUFACTURER:** Caldwell Manufacturing Company  
 P. O. Box 338  
 Kearney, Nebraska 68847-0338

#### OVERALL DIMENSIONS:

-- housing width 22.1 in (562 mm)  
 -- housing depth 25 in (635 mm)  
 -- housing height 21.75 in (552 mm)  
 -- inlet bell diameter 7.25 in (184 mm)  
 -- guard grill diameter 1.75 in (445 mm)  
 -- grill opening 0.125 in (3 mm) diameter, spaced at 0.75 in (19 mm) in a spiral pattern discharge opening 18 in (457 mm)

#### IMPELLERS:

-- diameter 12.75 in (324 mm)  
 -- inside flange diameter 8.8 in (224 mm)  
 -- number of blades 9  
 -- blade angle 86 degrees

#### WEIGHT:

125 lb (57 kg)

#### MOTOR NAMEPLATE DATA:

-- make Century  
 -- model 8-350715-01  
 -- frame M143T  
 -- class B  
 -- type CX  
 -- code G  
 -- duty air over  
 -- rpm 3450 rpm  
 -- service factor 1  
 -- ambient temperature rise 40°C  
 -- volts 230 V  
 -- amps 6.2 A  
 -- phase 1  
 -- cycles 60 Hz  
 -- horsepower 1.5 hp (1120 W)  
 -- maximum amps (air over duty) 7.6 A

#### 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.

#### SUMMARY CHART CALDWELL MODEL ILC 18-112 IN-LINE CENTRIFUGAL FAN

<b>RETAIL PRICE:</b>	\$895.00 (February, 1985, f.o.b. Lethbridge)
<b>FAN DESCRIPTION:</b>	12.75 in (324 mm) single speed, direct drive, 1.5 hp (1120 W) electric motor.
<b>FAN SPEED:</b>	3478 to 3539 rpm
<b>MAXIMUM EFFICIENCY:</b>	47%
<b>AIR FLOW RATE:</b>	
-range	240 to 2700 cfm (113 to 1270 L/s)
-at maximum efficiency	1710 cfm (807 L/s) at a 4.2 in wg (1050 Pa) static pressure
<b>POWER CONSUMPTION:</b>	1.11 to 1.80 kWh
<b>OPERATOR SAFETY:</b>	guard grill provided CSA approved Noise level: 78 dB(A) at 4.9 ft (1.5 m) from fan inlet
<b>OPERATOR'S MANUAL:</b>	complete and very informative



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