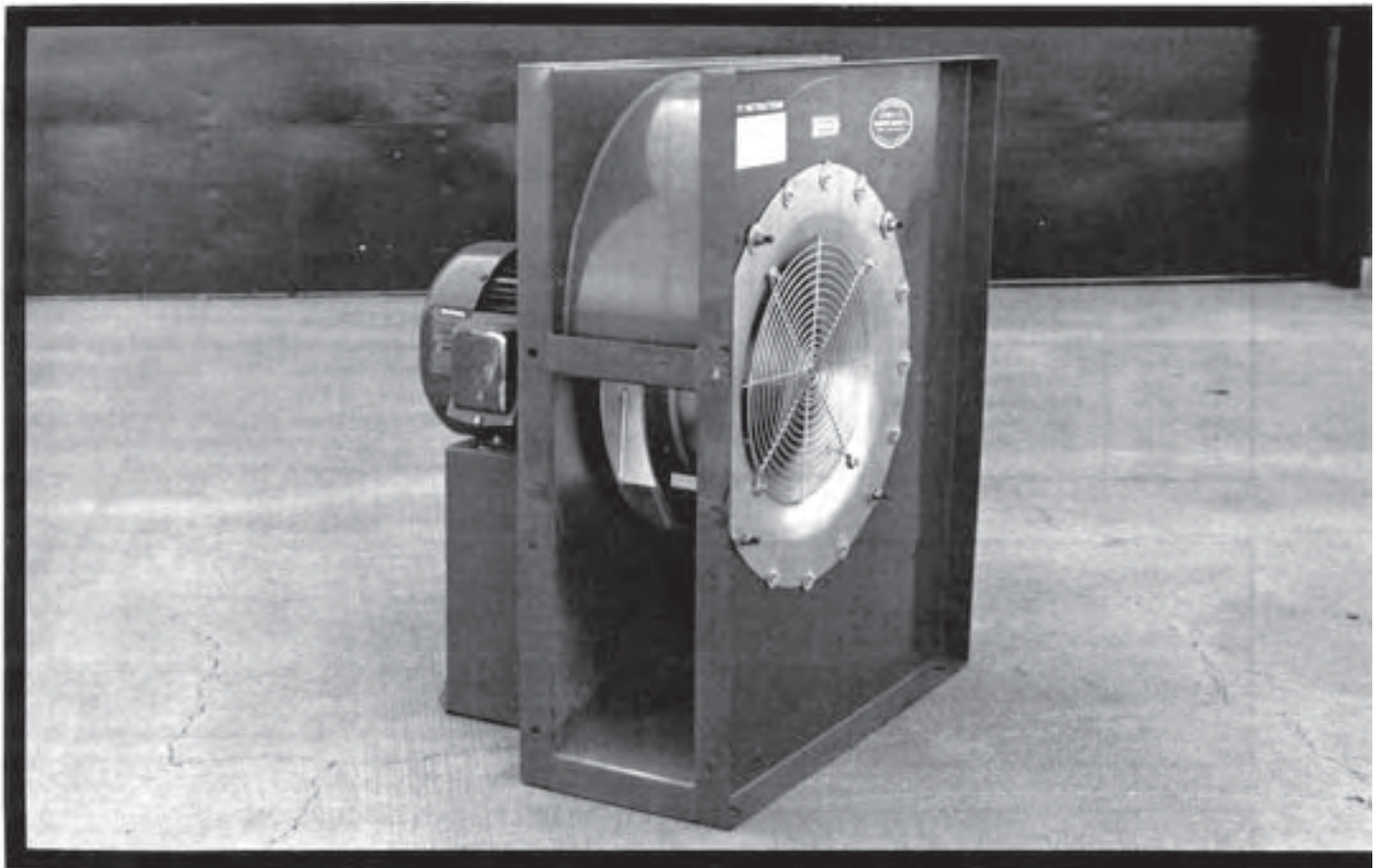


Evaluation Report

562



Ceco Model CA18753 Centrifugal Fan

A Co-operative Program Between



CECO MODEL CA18753 CENTRIFUGAL FAN

MANUFACTURER:

Combustion Equipment Company
 Division of Luffland Industries
 P.O. Box 228
 Bates City, MO 64011

DISTRIBUTOR:

Flaman Sales Ltd.
 Box 280
 Southey, Sask. S0G 4P0

RETAIL PRICE:

\$1995.00 (February, 1988, f.o.b. Lethbridge, Alberta).

SUMMARY OF RESULTS

TABLE 1. Ceco Model CA18753 Fan Performance at Typical Levels of Operation

Static Pressure		Air Flow Rate		Input Power	Total Efficiency	Fan Speed
in wg	(Pa)	cfm	(L/s)	kW	%	rpm
0.5	(125)	4300	(2030)	5.51	12	3547
1.0	(249)	4270	(2010)	5.63	15	3545
2.0	(498)	4130	(1950)	6.00	21	3541
3.0	(747)	3980	(1880)	6.36	27	3536
4.0	(996)	3870	(1830)	6.66	32	3532
5.0	(1260)	3780	(1780)	6.90	35	3529
6.0	(1490)	3670	(1730)	7.15	38	3525
7.0	(1740)	3530	(1670)	7.50	42	3520
8.0	(1990)	3360	(1590)	7.66	43	3517
9.0	(2240)	3150	(1490)	7.82	43	3513
10.0	(2490)	2930	(1380)	7.96	44	3510
11.0	(2740)	2730	(1290)	7.94	44	3510
12.0	(2990)	2540	(1200)	7.92	43	3510
13.0	(3240)	2290	(1080)	7.89	43	3511
14.0	(3490)	1800	(850)	7.25	36	3519
15.0	(3740)	771	(364)	5.66	17	3540
15.3	(3810)	212	(100)	4.98	7	3551

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying a table or curve of air flow rates over a complete range of static pressures.

Station Manager: R. P. Atkins

Project Engineer: K. Shimek

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. A table or curve of air flow rates over a range of static pressure will be supplied in the future.

GENERAL DESCRIPTION

The Ceco Model CA18753 fan is a 18 in (457 mm) diameter, single speed, direct drive, centrifugal fan. It is primarily used for grain aeration or grain drying systems.

The Ceco Model CA18753 fan is equipped with a wire mesh guard grill, an inlet bell and duct mounting flange. The steel impeller consists of a hub backplate, 9 backward curved blades and a flange. The impeller is directly mounted on the 7.5 hp (5.6 W), three phase, 230/460 V electric motor. The fan housing, motor mount and supports are of steel construction with a painted finish for corrosion protection.

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

SCOPE OF TEST

The Ceco Model CA18753 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 230 V. 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

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.

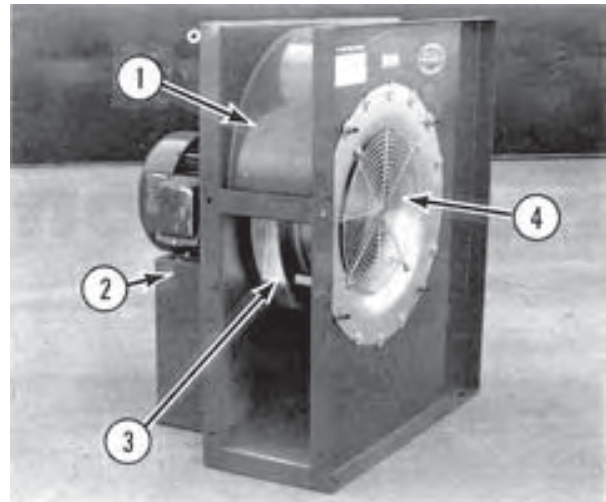


FIGURE 1. Ceco Model CA18753 Centrifugal Fan: (1) Fan Housing, (2) Motor Mount, (3) Impeller, (4) Inlet Bell and Guard Grill.

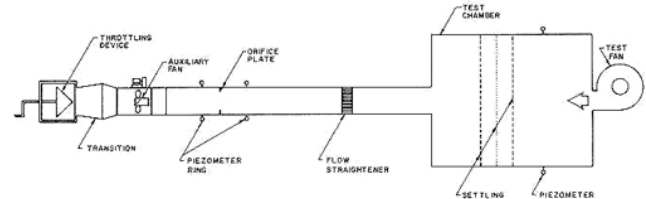


FIGURE 2. Schematic of Fan Test Apparatus - Outlet Chamber Setup.

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 212 cfm (100 L/s) at 15.3 in wg (3810 Pa) to 4300 cfm (2030 L/s) at 0.5 in wg (125 Pa). FIGURE 3 illustrates the fan performance curves for the Ceco CA18753 fan. The manufacturer did not provide any information on rated performance. It is recommended that for fan selection purposes, the manufacturer include a table or curve of air flow rates over a complete range of static pressures.

Power Consumption: The power consumption numbers given in TABLE 1 can be used to calculate the cost of operating the fan. To calculate the cost of fan operation, multiply the power consumption (kW) by the number of hours of fan operation times the cost per kilowatt hour.

The power consumed by the fan depended upon the point of operation of the fan. The power consumption varied from 4.98 kW at maximum static pressure and minimum air flow rate to 7.96 kW at 10.0 in wg (2490 Pa) static pressure and an air flowrate of 2930 cfm (1380 L/s). The maximum amperage drawn by the motor was 19.8 amps, which was less than the rated amperage of 20 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 7 to 44%. The maximum total efficiency of 44% occurred at 2930 cfm (1380 L/s) at a static pressure of 10.0 in wg (2490 Pa).

EASE OF OPERATION

Maintenance: Weekly inspection of the fan and of the electrical connections were required. Seasonal lubrication of the motor bearings was required.

OPERATOR SAFETY

The guard grill provided adequate protection from the fan

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

blades. The motor was a totally enclosed unit and presented no safety hazards.

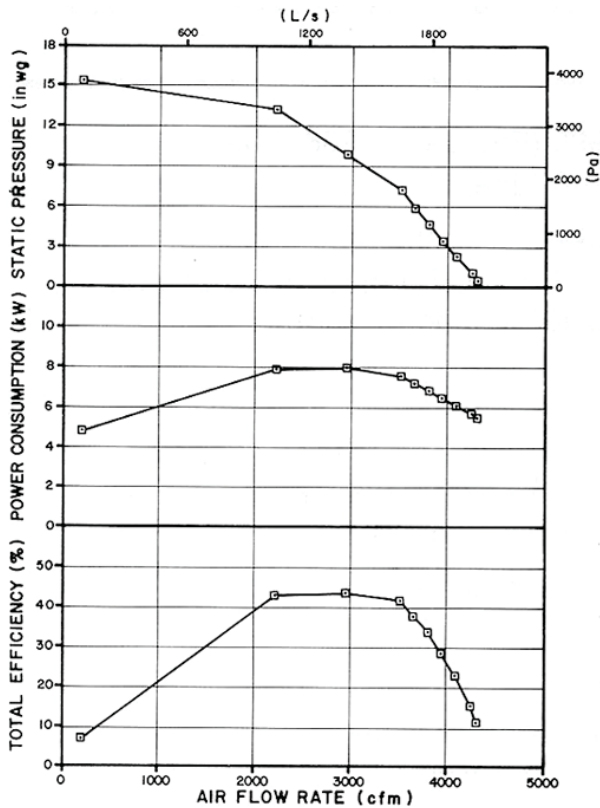


FIGURE 3. Ceco Model CA18753 Fan Performance Curves.

The noise level of the Ceco CA18753 fan, 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 96 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Ceco CA18753 fan 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.

OPERATOR'S MANUAL

The operator's manual was very informative and contained illustrations and information on operation, installation, wiring, maintenance and trouble shooting.

APPENDIX I SPECIFICATIONS

MAKE: Ceco
MODEL: CA18753
SERIAL NUMBER: 21231
MANUFACTURER: Combustion Equipment Company
 A Division of Luffland Industries
 P.O. Box 228
 Bates City, MO 64011

OVERALL DIMENSIONS:

- housing width 25.0 in (635 mm)
- housing depth 32.0 in (813 mm)
- housing height 38.0 in (965 mm)
- inlet bell diameter 11.0 in (279 mm)
- guard grill diameter 14.0 in (356 mm)
- grill opening 0.125 in (3 mm) diameter wire, spaced at 0.5 in (13 mm)
- discharge opening 8.5 x 20.5 in (216 x 521 mm)

IMPELLERS:

- diameter 18.0 in (457 mm)
- inside flange diameter 12.0 in (305 mm)
- number of blades 9
- blade angle 60 degrees

WEIGHT:

267 lb (120 kg)

MOTOR NAMEPLATE DATA:

- make Century
- part 6-350052-41
- frame F213T
- class F
- type SC
- code J
- design B
- duty Continuous
- rpm 3500
- service factor 1.15
- ambient temperature rise 40°C
- volts 230/460
- amps 20/10
- phase 3
- cycles 60
- horsepower 7.5 hp (5.6 kW)

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 CECO MODEL CA18753 CENTRIFUGAL FAN

RETAIL PRICE:	\$1995 (February, 1988, f.o.b. Lethbridge)
FAN DESCRIPTION:	18.0 in (457 mm) single speed, direct drive, 7.5 hp (6 W), 3 phase, 230/460 V electric motor.
FAN PERFORMANCE:	
Air Flow Rate:	
--range	212 to 4300 cfm (100 to 2030 L/s)
--at maximum efficiency	2930 cfm (1380 L/s) at a 10.0 in wg (2490 Pa) static pressure
Power Consumption:	4.98 to 7.96 kW
Total Efficiency:	maximum 44%
OPERATOR SAFETY:	guard grill provided CSA approved, noise level = 96 dB(A) at 4.9 ft (1.5 m) from fan inlet
OPERATOR'S MANUAL:	informative



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