

# Evaluation Report

# 390



## **Keho Model 15751 7.5 hp Hi-Flow Centrifugal Fan**

A Co-operative Program Between



# KEHO MODEL 15751 7.5 HP HI-FLOW CENTRIFUGAL FAN

## MANUFACTURER & DISTRIBUTOR:

Keho Alta Products Ltd.  
Box 70  
Barons, Alberta  
T0L 0G0

## RETAIL PRICE:

\$1450.00 with three phase motor and \$1600.00 with single phase motor (October, 1984, f.o.b. Lethbridge, Alberta).

## SUMMARY OF RESULTS

TABLE 1. Keho Model 15751 7.5 hp Fan Performance at Typical Levels of Operation

Static Pressure		Air Flow Rate		Input Power		Total Efficiency	Fan Speed
in wg	Pa	cfm	L/s	hp	W	%	rpm
0	0	6700	3160	9.68	7220	12	3468
1	249	6420	3030	10.4	7730	19	3467
2	497	6060	2860	10.5	7820	24	3469
3	747	5700	2690	10.9	8120	29	3468
4	996	2340	2520	11.3	8450	32	3465
5	1240	4950	2340	11.6	8690	34	3463
6	1490	4510	2130	11.7	8730	36	3461
7	1740	4040	1910	11.4	8520	39	3466
8	1990	3560	1680	10.9	8110	40	3484
9	2240	3050	1440	10.3	7650	40	3487
10	2490	2400	1130	9.75	7270	36	3495
11	2740	1320	624	9.52	7100	16	3520

## 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.
2. Supplying a detailed operator's manual containing information on 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. A performance curve or chart will be supplied with each blower.
2. An operator's manual will be included, containing information on installation, maintenance, rated performance, safety aspects and trouble shooting.

## GENERAL DESCRIPTION

The Keho Model 15751 7.5 hp Hi-Flow is a 16.5 in (419 mm) diameter, single speed, direct drive, centrifugal flow fan. It is primarily used for grain aeration or grain drying systems.

The Keho Model 15751 is equipped with a wire mesh guard grill, an inlet bell, duct mounting flange and weatherproof control switch. The molded copolymer impeller consists of a hub-backplate, 8 backward curved airfoil blades and a flange. The impeller is directly mounted on the 7.5 hp (5590 W) three phase, 208-230/460 V electric motor. The fan housing, support frame and motor mount 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 I.

## SCOPE OF TEST

The Keho Model 15751 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 460 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

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.

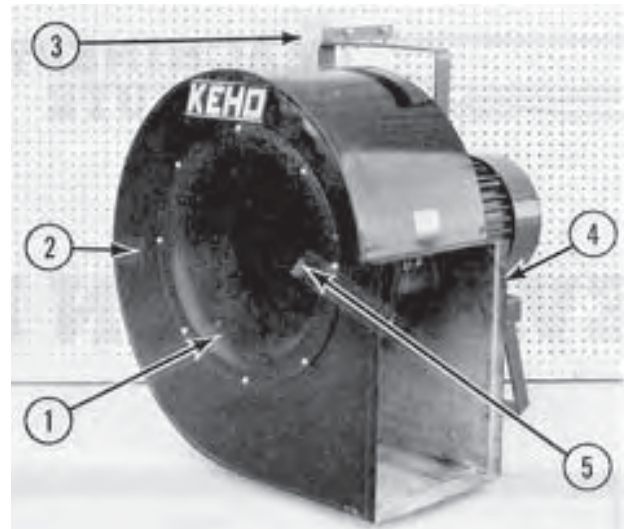


FIGURE 1. Keho Model 15751 7.5 hp Hi-Flow Centrifugal Fan: (1) Inlet Bell, (2) Fan Housing, (3) Control Switch, (4) Duct Mounting Flange, (5) Guard Grill.

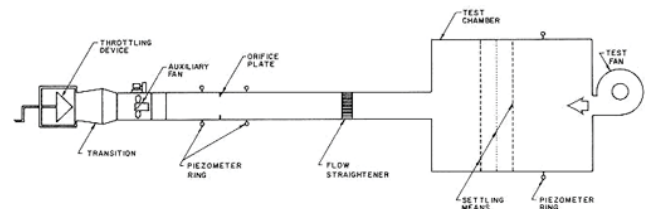


FIGURE 2. Schematic of Fan Test Apparatus - Outlet Chamber Setup.

**Air Flow Rate:** Fan output at typical levels of operation (i.e. static pressure<sup>2</sup>) are given in TABLE 1. The air flow rate ranged from 1320 cfm (624 L/s) at 11 in wg (2740 Pa) to 6700 cfm (3160 L/s) at 0 in wg (0 Pa). FIGURE 3 illustrates the fan performance curves for the Keho Model 15751 7.5 hp Hi-Flow fan. There was no manufacturer's performance information provided. It is recommended that for fan selection purposes, the manufacturer provide a table or curve of air flow rates over a complete range of static pressures.

**Power Requirements:** The power required to run the fan depended upon the point of operation of the fan. The input power required varied from 9.52 hp (7100 W) at maximum static pressure and minimum air flow rate to 11.7 hp (8730 W) at 6 in wg (1490 Pa) static pressure and an air flow rate of 4510 cfm (2130 L/s). The maximum amperage drawn by the motor was 9.1 amps, which was less than the rated motor amperage of 9.5 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 12 to 40%. The maximum total efficiency of 40% occurred at 3240 cfm (1530 L/s) at a static pressure of 8.6 in wg (2150 Pa).

## EASE OF OPERATION

**Maintenance:** No maintenance instructions were supplied.

## 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 Keho Model 15751 was CSA approved.

The noise level<sup>3</sup> of the Keho Model 15751, at a distance of

<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).

<sup>3</sup>PAMI Test Procedure for Determining Fan Noise Level.

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 89 dB(A). Higher noise levels could be expected if the fan was operated in the vicinity of other buildings. The Keho Model 15751 falls within the 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.

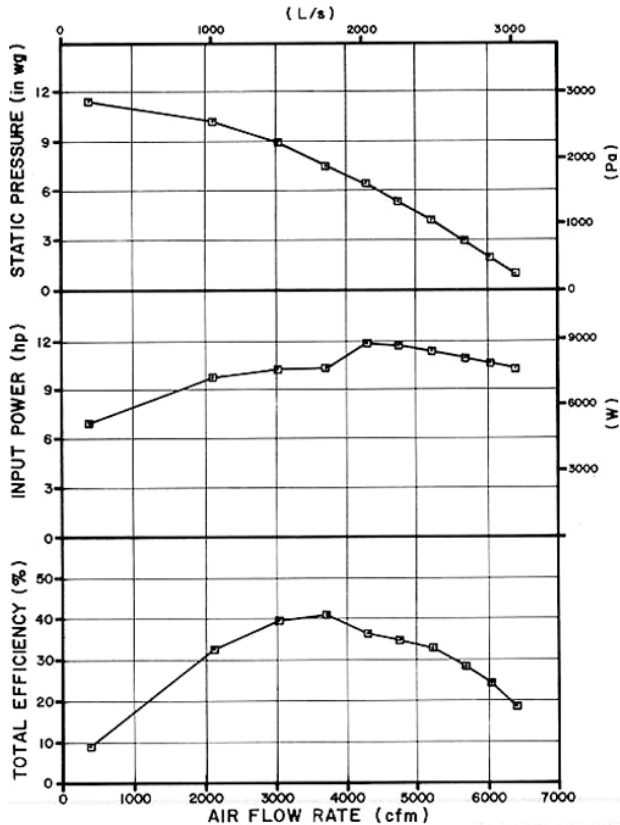


FIGURE 3. Keho Model 15751 Fan Performance Curves.

**OPERATOR'S MANUAL**

The operator's manual contained very useful information on aeration and natural air drying, but had very little information on the fan itself. It is recommended that the manufacturer supply a detailed manual containing information on installation, maintenance, rated performance, safety aspects and trouble shooting.

APPENDIX I SPECIFICATIONS	
<b>MAKE:</b>	Keho
<b>MODEL:</b>	15751 7.5 hp Hi-Flow Fan
<b>MANUFACTURER:</b>	Keho Alta Products Ltd. Box 70 Barons, Alberta T0L 0G0

<b>OVERALL DIMENSIONS:</b>	
-- housing width	29 in (737 mm)
-- housing depth	27.5 in (699 mm)
-- housing height	33 in (838 mm)
-- inlet bell diameter	10.75 in (273 mm)
-- guard grill diameter	18.25 in (464 mm)
-- grill opening	28 gauge (0.4 mm) wire on 0.25 in (6mm) grid
-- discharge opening	12.75 x 17.25 in (324 x 438 mm)
<b>IMPELLER:</b>	
-- diameter	16.5 in (419 mm)
-- width	5.5 in (140 mm)
-- inside flange diameter	12 in (305 mm)
-- number of blades	8
-- blade angle	45 degrees
<b>WEIGHT:</b>	
	221 lb (100 kg)
<b>MOTOR NAMEPLATE DATA:</b>	
-- make	Teco
-- model	CU4537302
-- frame	213T
-- class	B
-- type	AEEA
-- code	H
-- design	B
-- duty	continuous
-- rpm	3445
-- service factor	1.15
-- ambient temperature rise	40°C
-- volts	208-230/460 V
-- amps	20-19/9.5 A
-- phase	3
-- cycles	60 Hz
-- horsepower	7.5 hp (5590 W)

APPENDIX II NOISE LEVEL RANGES		
SOUND LEVEL		
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 KEHO MODEL 15751 7.5 HP HI-FLOW CENTRIFUGAL FAN	
<b>RETAIL PRICE:</b>	\$1450.00 with three phase motor and \$1600.00 with single phase motor (October, 1984, f.o.b. Lethbridge)
<b>FAN DESCRIPTION:</b>	16.5 in (419 mm) single speed, direct drive, 7.5 hp (5590 W) three phase electric motor.
<b>FAN SPEED:</b>	3461 to 3520 rpm
<b>MAXIMUM EFFICIENCY:</b>	40%
<b>AIR FLOW RATE:</b>	-range 1320 to 6700 cfm (624 to 3160 L/s) -at maximum efficiency 3240 cfm (1530 L/s) at a 8.6 in wg (2150 Pa) static pressure
<b>INPUT POWER:</b>	9.52 to 11.7 hp (71 00 to 8730 W)
<b>OPERATOR SAFETY:</b>	Guard grill provided CSA approved Noise level = 89 dB(A) at 4.9 ft (1.5 m) from fan inlet
<b>OPERATOR'S MANUAL:</b>	Good general information but need more detail on the fan itself.

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