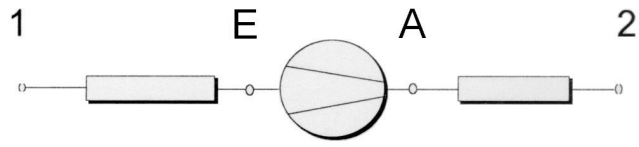
Fan characteristic data

Type	HRV 63S-2000/K	Person responsible	VAL
Customer	IMPEXRON GmbH	Date	16.11.15
Remarks	Cooler Exhaust Fan G-09		
Job Number	Turkmenistan		



Operating point		Design	
Volume flow, normal condition	V_{norm}	244.593	Nm³/h
Volume flow, fan inlet	V_1	342.000	m³/h
Volume flow, fan inlet	V_E	342.000	m³/h
Mass flow	m	291.389	kg/h
Mass flow dust	m_{st}	10,3	kg/h
Altitude	h	200	m a.s.l.
Air pressure	pb	98.915	Pa
Pressure increase (1 - 2) , total	Δp_{1-2}	4.052	Pa
Internal losses at fan inlet (1 - E)	Δp_{1-E}	0	Pa
Internal losses at fan outlet (A - 2)	Δp_{A-2}	0	Pa
Pressure increase (E - A) , static	Δp_{E-A}	3.922	Pa
Static pressure (at fan inlet)	p_E	-3.922	Pa
Static pressure (at fan outlet)	p_A	0	Pa
Dynamic pressure (at fan inlet)	$p_{d\,1}$	238	Pa
Dynamic pressure (at fan outlet)	$p_{d\,2}$	368	Pa
Velocity at fan inlet	c_1	23,65	m/s
Velocity at fan outlet	c_2	29,00	m/s
Temperature (at fan inlet)	t_E	85,00	°C
Gas constant	R	311,30	Nm/kg K
Specific flow work	Y_t	4.685	Nm/kg
Total pressure increase (E - A)	Δp_t	4.052	Pa
Total pressure increase (E - A) at density ρm=1,205 kg/m³	$\Delta p_{t\,1,205}$	5.654	Pa
Density (at fan inlet)	ρ_1	0,852	kg/m³
Density (at fan inlet)	ρ_E	0,852	kg/m³
Density (at fan outlet)	ρ_A	0,875	kg/m³
Speed of rotation	n_v	744	1/min
Impeller diameter	D_2	2,664	m
Efficiency	η_{tw}	82,96	%
Rated power	P_n	379,23	kW
Power consumption	P_W	457,13	kW
Tip speed	u_2	103,76	m/s
Temperature (at fan outlet)	t_A	90,42	°C

The characteristic data will be determined according to DIN EN ISO 5801.
The accuracy classes acc. to DIN 24166 apply to the limiting deviations.

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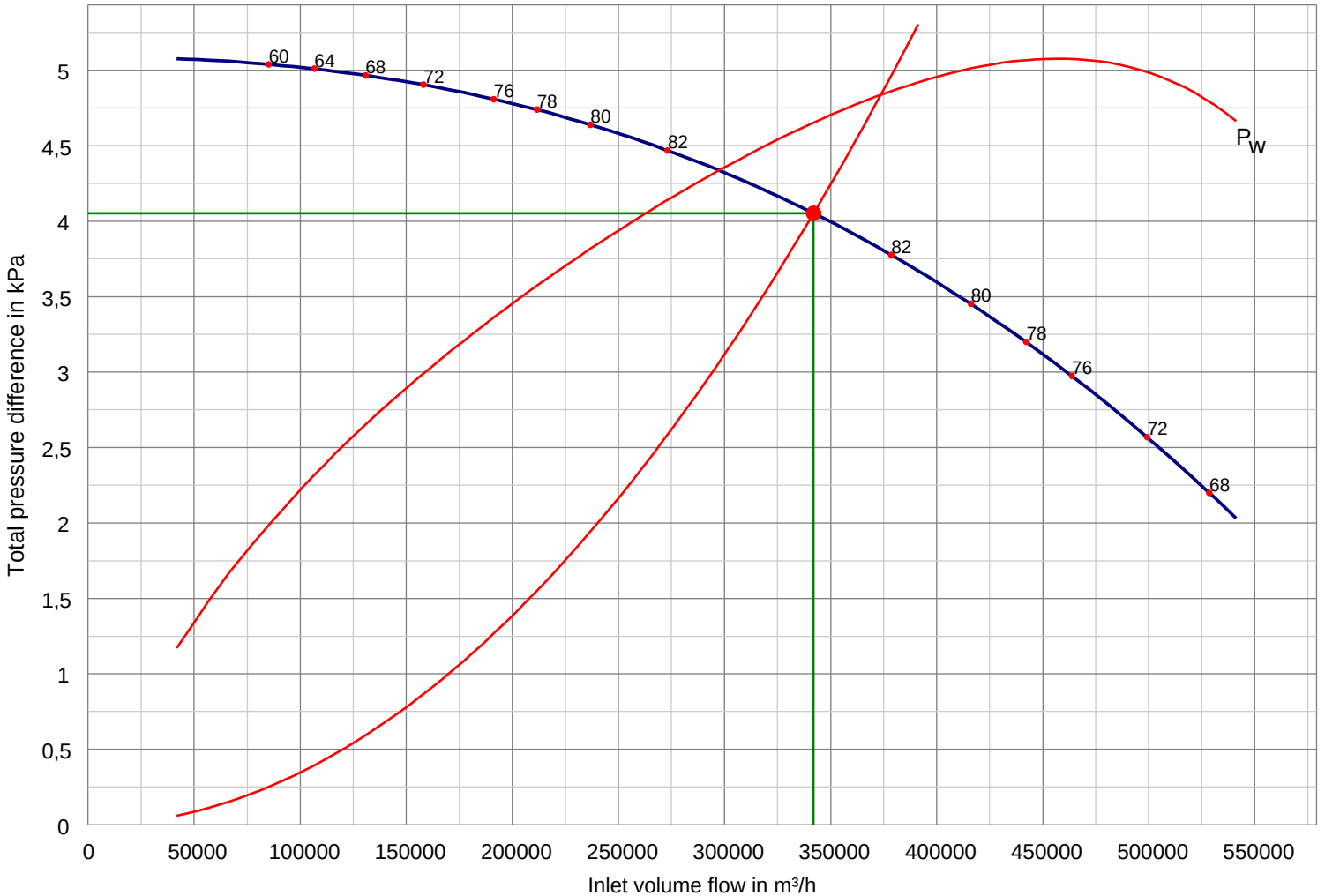
Fan characteristic curve



Type

HRV 63S-2000/K

Customer
IMPEXRON GmbH

Remarks
Cooler Exhaust Fan G-09

Job Number
Turkmenistan

Person responsible
VAL

Date
16.11.15

Operating point		Design						
Volume flow, fan inlet	V_E	342.000						m³/h
Total pressure increase (E - A)	Δp_t	4.052						Pa
Speed of rotation	n_V	744						1/min
Drive power, fan shaft input	P_W	457,13						kW
Density (at fan inlet)	ρ_E	0,852						kg/m³

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Calculation of fan sound level

Type	HRV 63S-2000/K	Person responsible	VAL
Customer	IMPEXRON GmbH	Date	16.11.15
Remarks	Cooler Exhaust Fan G-09		
Job Number	Turkmenistan	Operating point	Design

Volume flow	V_E	342.000	m³/h	Density	ρ_E	0,852	kg/m³
Volume flow	V_A	332.971	m³/h	Speed of rotation	n	744	1/min
Total pressure increase	Δp_t	4.052	Pa	Number of blades	Sz	12	-
Main interference frequency	f_s	149	Hz	Gas constant	R	311,30	Nm/kg K
Measuring-surface level	L_s	21	dB	Gas temperature	t_E	85,00	°C
Measuring-surface level	L_k	5	dB	Gas temperature	t_A	90,42	°C
				Duct connection	ø	2,00	m
Fan enveloping surface in width x height x length				1,8 m x 4,0 m x 4,0 m (s=1mm)			

Inlet and outlet side emission data at operating point
With free inlet or outlet

Designation			63	125	250	500	1k	2k	4k	8k	Sum
Lw	dB	outlet side	121	120	117	113	109	104	98	91	125
Lw	dB	inlet side	120	118	115	108	103	98	91	84	123
LwA	dB(A)	outlet side	95	104	108	110	109	105	99	90	115
LwA	dB(A)	inlet side	94	102	106	105	103	99	92	83	111
Lp	dB	ds* 1m/45°	107	106	103	99	95	90	84	77	111
Lp	dB	ss* 1m/45°	106	104	101	94	89	84	77	70	109
LpA	**dB(A)**	**ds* 1m/45°**	**81**	**90**	**94**	**96**	**95**	**91**	**85**	**76**	**101**
LpA	**dB(A)**	**ss* 1m/45°**	**80**	**88**	**92**	**91**	**89**	**85**	**78**	**69**	**97**

*) ds = free outlet; ss = free inlet

Sound emission from fan casing at operating point
Inlet and outlet connected

Designation			63	125	250	500	1k	2k	4k	8k	Sum
Lw	dB		98	101	101	99	97	92	87	79	107
LwA	dB(A)		72	85	92	96	97	93	88	78	101
Lp	dB	1 m from env. surf.	77	80	81	78	76	72	66	58	86
LpA	**dB(A)**	**1 m from env. surf.**	**51**	**64**	**72**	**75**	**76**	**73**	**67**	**57**	**81**

The calculation is based on the aeroacoustic performance data of the fans and does not take account of sounds from drive motors, v-belts, bearings and any cooling impellers.

DIN 45635-01-K12 applies as framework standard for checking at a guide factor of Q =2 and free field conditions

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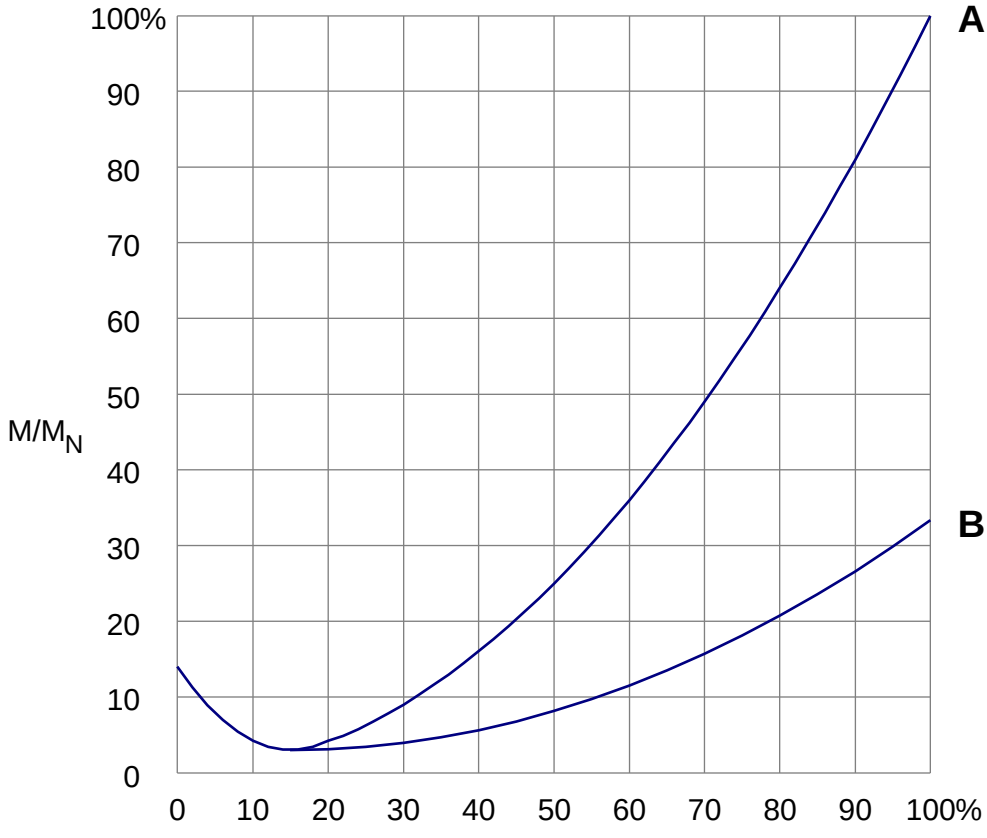
Speed torque curve

Type	HRV 63S-2000/K	Person responsible	VAL
Customer	IMPEXRON GmbH	Date	16.11.15
Remarks	Cooler Exhaust Fan G-09		
Job Number	Turkmenistan		



A) Inlet vane control/ Damper"Open"
B) Inlet vane control/ Damper"Closed"

$$M_N = 9550 \frac{P_W}{n_L}$$

Volume flow	V	=	342.000	Bm³/h	
Operating temperature	t	=	85,00	°C	
Total pressure increase	Δp_t	=	4.052	Pa	at rho = 0,852 kg/m³ and t = 85,0°C
Speed of rotation of impeller	n_L	=	744	1/min	
Basic torque	M_N	=	5.867,26	Nm	at rho = 0,852 kg/m³ and t = 85,0°C
Mass moment of inertia of the rotor	J	=	1940	kg m²	
Required power	P_W	=	457,13	kW	at rho = 0,852 kg/m³ and t = 85,0°C
recommended motor nominal power	P_M	=	560	kW	
Motor basic speed	n_M	=	744	1/min	

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