TE

GLASS REINFORCED POLYAMID WHEELS FOR PLENUM FANS

comefri®

COMEFRI SpA factory at Magnano in Riviera (UD) - Italy with 14,500 m^2 manufacturing floor space, which produces radial fans for HVAC products.

COMEFRI SpA factory at Artegna (UD) - Italy with 6,300 m^2 manufacturing and laboratory floor space for the production of standard and special application industrial fan.

Contents

1. GENERAL DESCRIPTION

The single inlet glass reinforced polyamid centrifugal wheel TE, has been designed for clean air. Due to its low weight and moment of inertia, the TE wheel is particurarly suitable for direct drive applications.

A substantial aluminium hub is connected to the backplate. The hub bore is precision machined and incorporates a keyway and locking screw.

All impellers are statically and dynamically balanced to a grade of Q=6,3 in accordance with DIN ISO 1940-1 and ANSI S2.19 - 1989.

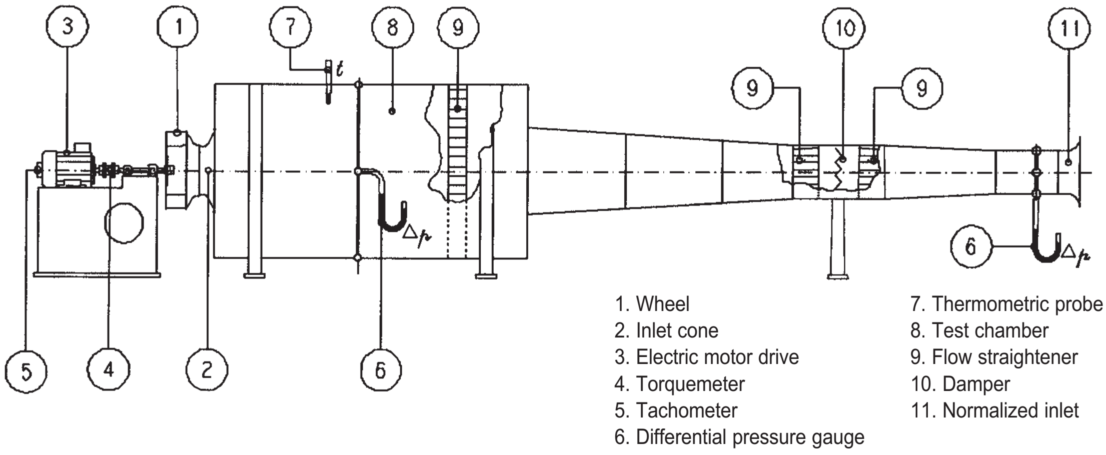
The inlet cone is designed to give the best aerodynamic performance.
Maximum operating temperature 60°C for all the wheels.

2. WHEEL PERFORMANCE

2.1 Performance Data

The TE high performance airfoil impeller has been tested, in Comefri's certified laboratory, in accordance with DIN 24163 / BS 848 - Part.1 / ISO 5801 / AMCA 210 fig.14 (ref. to figure) and results refer at density of ρ =1,2 kg/m^3. Power ratings not include bearing losses.

Performance test rig scheme according to DIN 24163 / BS 848 Part.1 / ISO 5801 / AMCA 210 fig.14



The performance curves include the following information:

Static pressure	Δp_{stat}	[Pa]
Volume air flow	V	[m^3/h]
Wheel absorbed shaft power	P_w	[kW]
Fan speed	n	[min^{-1}]
Static Efficiency	$\eta_{st} = \dfrac{\Delta p_{stat} \cdot V}{P_w \cdot 36000}$	[%]
Total Efficiency	(η_t) *	[%]
Sound Power Level	L_{w6}	[dB]

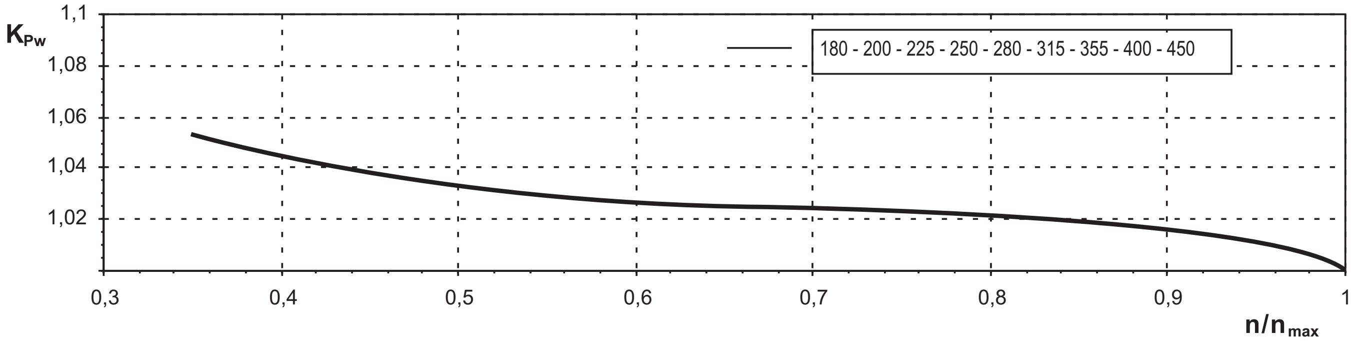
** theoric value calculated taking into account the dynamic pressure at the impeller outlet*

2.2. Power correction

It is well known that fan efficiency decreases when fan is running far from its maximum speed.
The efficiencies marked in the performance graph curves must be corrected considering the real wheel speed n.

To obtain the correct absorbed power, multiply the readed value on performances curve by a corrective factor “K_{Pw}”, for the choosen wheel speed.

The factor “K_{Pw}” can be read off from the graph 2.2, as a function of the ratio n / n_{max}, where n is the required wheel speed and nmax is the maximum permissible wheel (K_{Pw}=1 when n = n_{max}).



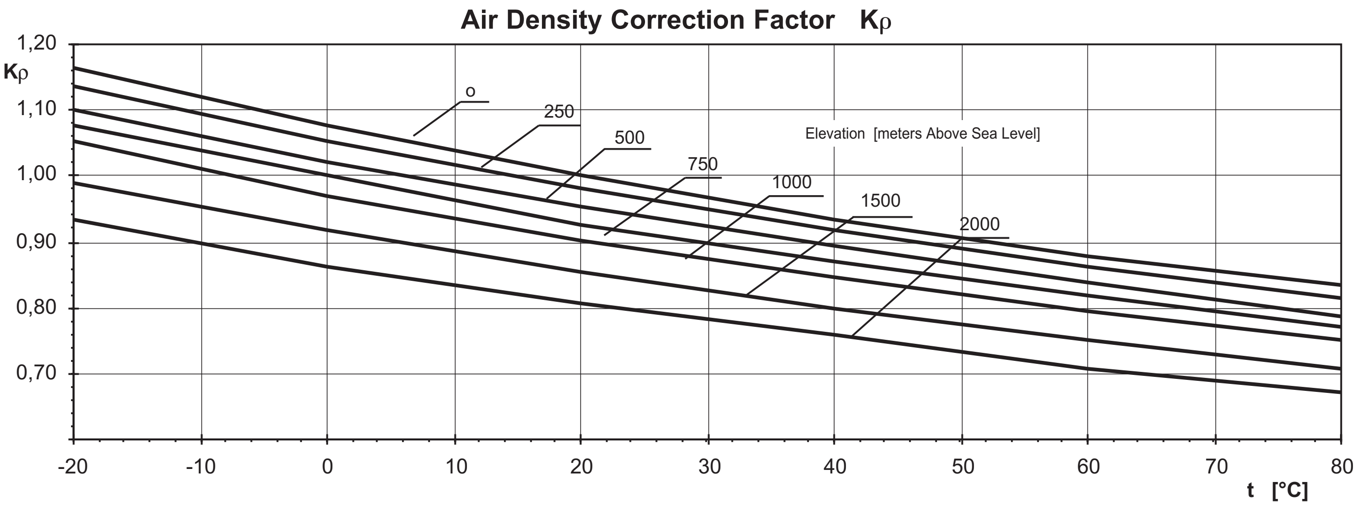
Graph n° 2.2

2.3. Temperature and altitude correction factors

The performance charts refer to the standard air condition, i.e. ρ = 1,2 kg/m^3, 20°C temperature and sea level.
For different operating conditions the performance data must be corrected due to the change in air density.
Fan laws relate performance variables for any fan of a given design.
Static pressure varies directly as the ratio of the air densities, $K\rho$
$\Delta p_{stat2} = \Delta p_{stat1} \circ K\rho$

Absorbed power varies directly as the ratio of the air densities, $K\rho$
$P_{w2} = P_{w1} \circ K\rho$

The Graph 2.3 contains air density ratios $K\rho$ for temperatures from –20°C to 80°C and elevations up to 2000 m above sea level.
Please refer to the Selection Example 4.3., for further details on the correct selection procedure.



Graph n° 2.3

2.4 Motor selection

To determine the motor rating P_N, the wheel absorbed shaft power P_w must be increased by a factor f_w to accommodate for the arrangement losses, safety margins,…..etc.

$$P_N = P_w (1 + f_w)$$

The factor fw can be chosen from the following figures:

$P_w \leq 3$ kw. . . . $f_w = 0{,}08$
$P_w > 3$ kw. . . . $f_w = 0{,}06$

When selecting the suitable motor, the run-up time must be considered.
The run-up time "t_a" can be calculated according to the following formula:

$$t_a = 8 \cdot \frac{J \cdot n^2}{P_N} \cdot 10^{-6}$$

where:

t_a	acceleration time	[s]
J	moment of inertia of the revolving parts	[kg m^2]
n	impeller revolution	[min^{-1}]
P_N	motor rating	[kW]

If "t_a" exceed the motors' manufacturer recommendations, a larger motor or a high-torque type must be used.

3. SOUND LEVELS

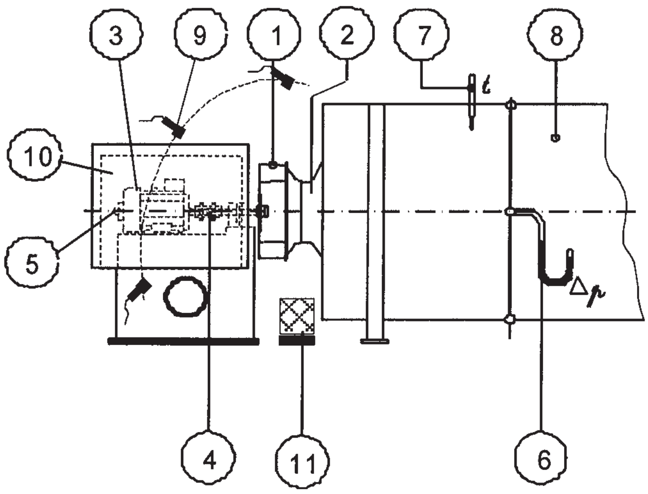
The measurement of noise levels have been made according to ISO 3747, DIN 45635 and BS 848 Part.2, Survey Method using a Reference Sound Source, Standards, using a Bruel & Kjaer calibrated sound source and a real-time frequency analyzer.

The Sound Power Level L_{w6}, referred to $W_0=10^{-12}$ Watt, required for calculation and design of sound attenuation units, are marked on the performance curves.

Symbols and Formulae:

L_{w6}	Total Sound Power Level at the wheel outlet	[dB]
L_{woct6}	Sound Power Level at a specific Octave Band Mid-Frequency	[dB]
f_m	Octave Band Mid-Frequency	[Hz]
ΔL_{woct6}	Difference between the Total Sound Power Level L_{woct6} at the corresponding Octave Band Mid-Frequency and the Total Sound Power Level L_{w6}	[dB]
ΔL_{wA6}	Difference between the Total Sound Power Level L_{w6} and the A-weighted Total Sound Power Level L_{wA6}	[dB(A)]

Sound measurement test rig scheme according to ISO 3747 / DIN 45635 / BS 848 Part.2
Uncertainty in determining A-weighted Sound Power Level by the survey method is 4 dB(A)



1. Wheel
2. Inlet cone
3. Electric motor drive
4. Coupling
5. Tachometer
6. Differential pressure gauge
7. Thermometric probe
8. Performance test rig
9. Microphone
10. Motor anechoic silencer
11. Reference Sound Source

Fan Sound Data are determined as follows:

1) The Total Sound Power Level L_{w6}, at the wheel outlet can be read from the Performance Chart, for a given wheel performance.

2) The Sound Power Level L_{woct6}, at a specific Octave Band Mid-Frequency, at the wheel outlet, can be determined from following formula:

$$L_{woct6} = L_{w6} + \Delta L_{woct6}$$

3) The A-weighted Total Sound Power Level at the wheel outlet, can be determined from following formula:

$$L_{wA6} = L_{w6} - \Delta L_{wA6}$$

4) The values for ΔL_{woct6} and ΔL_{wA6} for each wheel size can be found in the Sound Data Tables section 3.1., considering the range of wheel speed.

3.1. Sound Data tables

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 180	$n < 4200$	5,7	-7	-5	-8	-6	-12	-15	-20	-24
	$n \geq 4200$	4,4	-7	-6	-9	-5	-10	-13	-18	-22

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 200	$n < 4200$	5,7	-7	-5	-8	-6	-12	-15	-20	-24
	$n \geq 4200$	4,4	-7	-6	-9	-5	-10	-13	-18	-22

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 225	$n < 4200$	4,3	-7	-5	-9	-7	-12	-11	-13	-16
	$n \geq 4200$	4,0	-7	-8	-7	-6	-10	-11	-14	-17

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 250	$n < 3350$	2,1	-10	-8	-7	-8	-7	-8	-12	-16
	$n \geq 3350$	3,1	-6	-9	-10	-8	-11	-8	-12	-15

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 280	$n < 3350$	4,1	-9	-7	-6	-9	-10	-10	-15	-17
	$n \geq 3350$	5,2	-5	-10	-8	-9	-12	-11	-15	-18

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 315	$n < 2700$	4,0	-5	-10	-7	-10	-10	-9	-15	-18
	$n \geq 2700$	3,7	-7	-6	-8	-8	-10	-9	-15	-17

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 355	$n < 2700$	3,8	-5	-11	-7	-10	-10	-9	-14	-16
	$n \geq 2700$	2,5	-7	-9	-9	-8	-10	-7	-12	-16

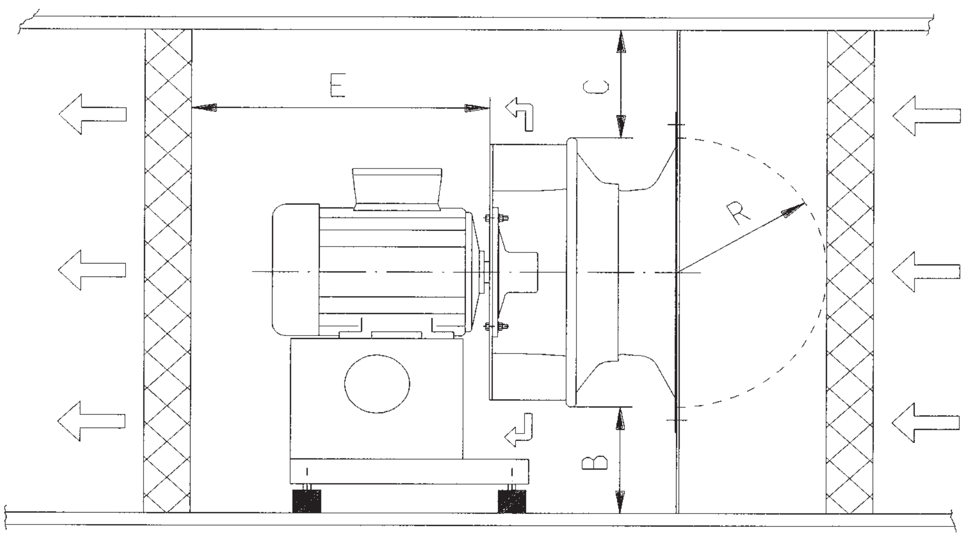
Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 400	$n < 2100$	5,2	-3	-11	-9	-11	-9	-13	-15	-19
	$n \geq 2100$	4,3	-4	-12	-9	-11	-9	-10	-15	-18

Fan Model and Size	Speed range	ΔL_{WA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 250	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
TE 450	$n < 2100$	3,4	-8	-10	-6	-9	-8	-10	-14	-16
	$n \geq 2100$	2,7	-8	-12	-6	-9	-8	-8	-14	-16

4. MINIMUM DISTANCES AND SELECTION CRITERIA

4.1. Minimum distances

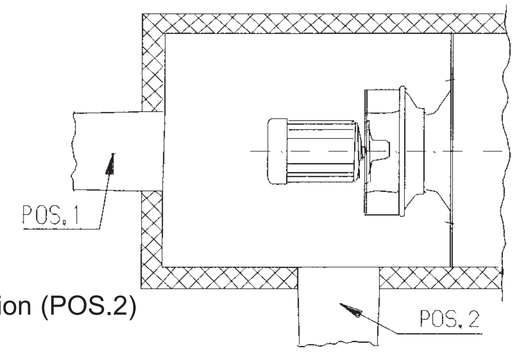
The following minimum distances are recommended for a correct plug fan installation:
E > ØA
R > 0,5 · ØA
B, C > 0,4 · ØA
where ØA = max wheel diameter (see table).



WHEEL Ø	ØA [mm]
180	**180**
200	**202**
225	**226**
250	**250**
280	**282**
315	**316**
355	**357**
400	**402**
450	**455**

4.2. Plenum effect losses

The loss associated with the duct take off from the plenum must be added to the static pressure required by the fan.
These losses, as literature indicates, are:
for axial ducted discharge (POS.1)
$\Delta 1 = 2 \cdot p_{dc}$
for radial ducted discharge (POS.2)
$\Delta 2 = 1{,}5 \cdot p_{dc}$
where: p_{dc} = dynamic pressure in the discharge duct



Example: 0,315 · 0,315 m discharge duct ($A = 0{,}099\ m^2$), radial position (POS.2)
ρ = air density = 1,2 kg/m^3
V = required air flow volume 3600 m^3/h = 1 m^3/s
Δp_f = required static pressure = 1008 Pa
$p_{dc} = 1/2 \cdot \rho \cdot (V/A)^2 = 0{,}5 \cdot 1{,}2 \cdot (1/0{,}099)^2 = 61$ Pa
$\Delta 2 = 1{,}5 \cdot 61 = 92$ Pa

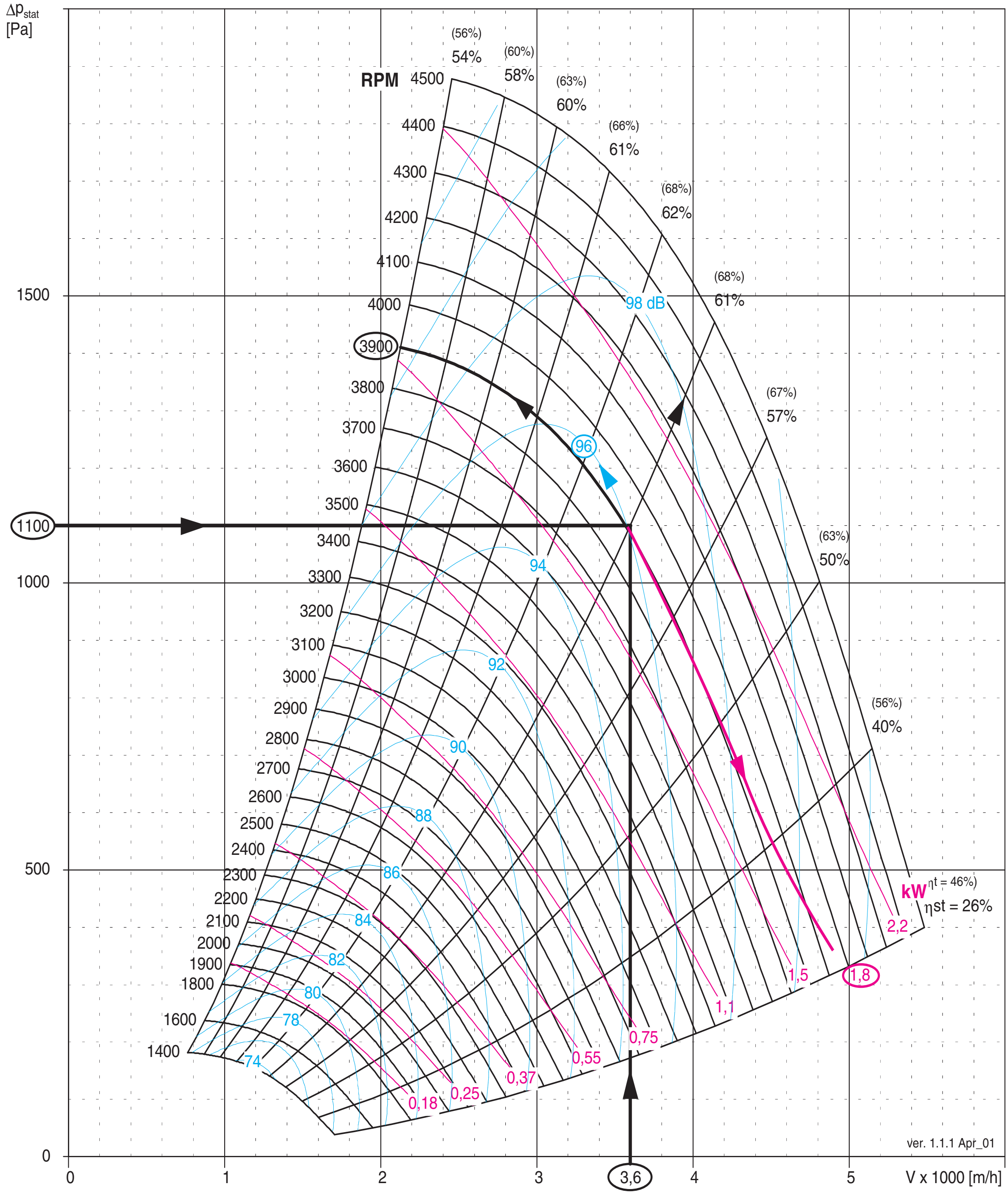
TE selection has to be done with the following data:
$\Delta p_{stat} = 1008 + 92 = 1100$ Pa
V = 3600 m^3/h

4.3. Selection Example

Wheel selection for the following operating parameters:

Model/Size	TE 280
Wheel Max RPM [min^{-1}]	4400
Wheel Max kW	2,75
Wheel No. Blades	8

V = 3600 m^3/h
Δp_{stat} = 1100 Pa
ρ = 1,2 kg/m^3
t = 20 °C



Selection model and size: **TE 280**

n = 3900 min^{-1}
L_{w6} = 96 dB
η_{st} = 61 %
P_w = 1,8 kW
η_t = 68 %

a) Power correction

The corrected absorbed power can be calculated as follow:

The ratio n/n_{max} is equal to: 3900 / 4400 = 0,886

The value of K_{Pw} is read on the graph 2.2, corresponding to: K_{Pw} = 1,015

therefore the corrected absorbed power P_{wcorr} is: P_{wcorr} = 1,8 · 1,015 = 1,827 kW

b) Sound data

The following steps must be followed to determine the Octave Band values:

b1) Read on the Sound Data Table 3.1, for TE 280, each Octave Band and considering the selected wheel speed ($n \geq 3350\ min^{-1}$) the appropriate values for ΔL_{woct6}:

ΔL_{wA6}	ΔL_{woct6} 63	ΔL_{woct6} 125	ΔL_{woct6} 25	ΔL_{woct6} 500	ΔL_{woct6} 1000	ΔL_{woct6} 2000	ΔL_{woct6} 4000	ΔL_{woct6} 8000
5,2	-5	-10	-8	-9	-12	-11	-15	-18

b2) Apply these corrections to L_{w6} = 96 dB (add the ΔL_{woct6} values) to obtain the values of L_{woct6}:

L_{woct6} 63	L_{woct6} 125	L_{woct6} 25	L_{woct6} 500	L_{woct6} 1000	L_{woct6} 2000	L_{woct6} 4000	L_{woct6} 8000
91	86	88	87	84	85	81	78

b3) To obtain the L_{wA6} A-weighted Total Sound Power value, add to L_{w6} the ΔL_{wA6} value

$$L_{wA6} = L_{w6} - \Delta L_{wA6} = 96\ dB - 5,2 = 90,8\ dB(A)\ \text{(rounded off to 91 dB(A))}$$

b4) To obtain the A-Weighted Octave Band values, apply to each octave-band value the correction factor, listed here below:

Octave Band Mid-Frequency	63	125	250	500	1000	2000	4000	8000
A-Weighting	-26	-16	-9	-3	0	+1	+1	-1

(Values rounded off)

L_{woctA6} , A-weighted values, are consequently $L_{woctA6} = L_{woct6}$ - (A-weighting):

L_{woct6} 63	L_{woct6} 125	L_{woct6} 25	L_{woct6} 500	L_{woct6} 1000	L_{woct6} 2000	L_{woct6} 4000	L_{woct6} 8000
65	70	79	84	84	86	82	77

c) Temperature and altitude correction

If temperature and altitude at which the fan will operate are not standard, the pressure value used for the selection must be corrected. Let's consider the following parameters:

Air volume: 3600 m^3/h
Required static pressure: 935 Pa referred to the following conditions:

Operating temperature: 40 °C
Altitude: 1000 m a.s.l.

From Kρ Air Density Correction Factor table (Graph 2.3) the value of 0,85 is obtained.

The corrected pressure, to be used for the selection on the performance chart, is therefore:

$$\Delta p_{stat\ corr} = \frac{\Delta p_{stat}}{K\rho} = \frac{935}{K\rho} = 1100 \text{ Pa}$$

Selection should be made with a corrected static pressure equal to 1100 Pa.

We obtain the following operating parameters:

Selected model and size:

TE 280
n = 3900 [min^{-1}]

Effective absorbed power on wheel shaft (corrected value) at that altitude and temperature, will be:

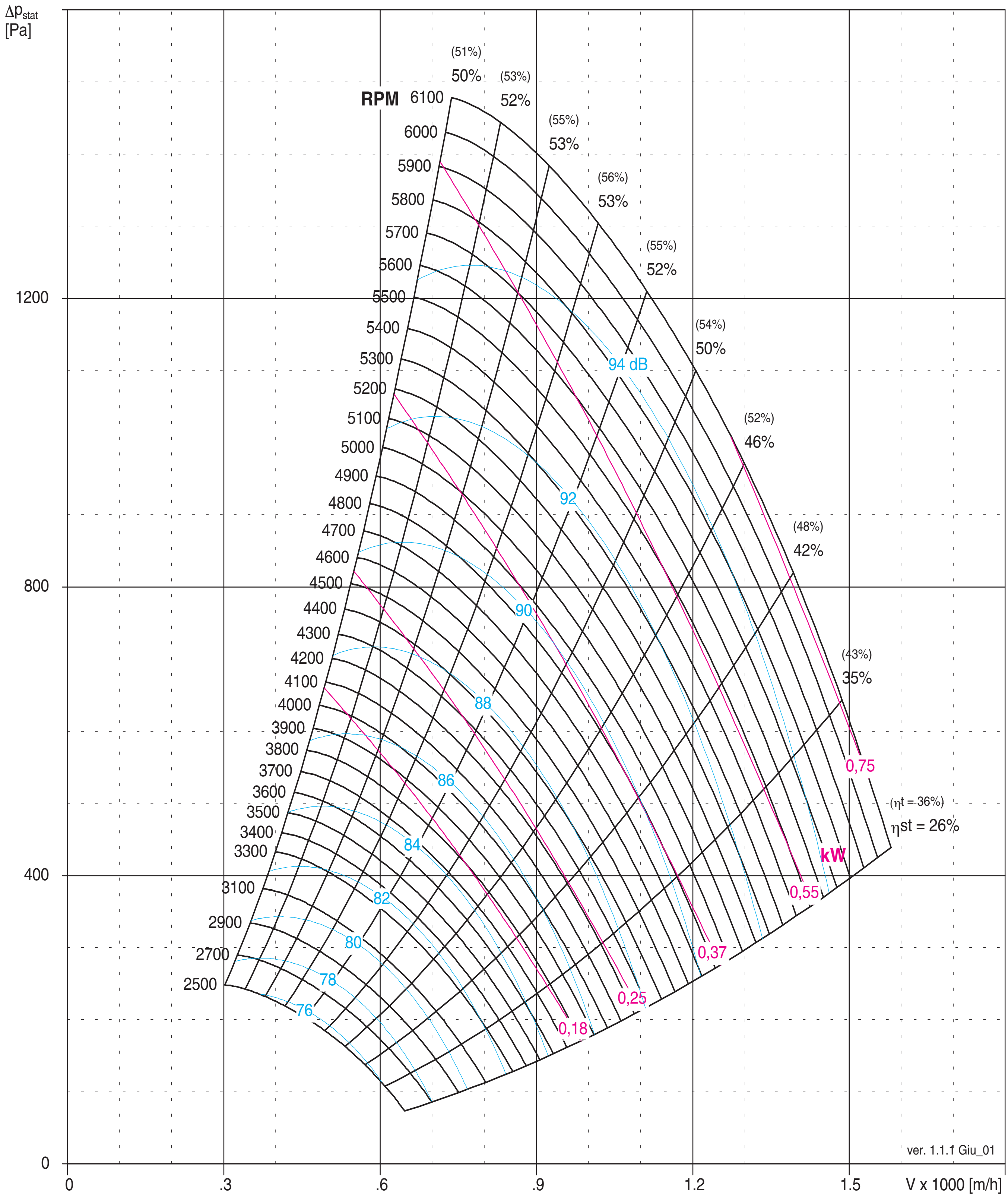
$P_w = P_{wcorr} \cdot K\rho = 1{,}827 \cdot 0{,}85 = 1{,}55$ kW

5. Performance charts

Page

Model/Size	TE 180
Wheel Max RPM [min^{-1}]	6050
Wheel Max kW	0,8
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3
Free inlet - Free outlet
L_{W6} : Total Sound Power Level at the wheel outlet

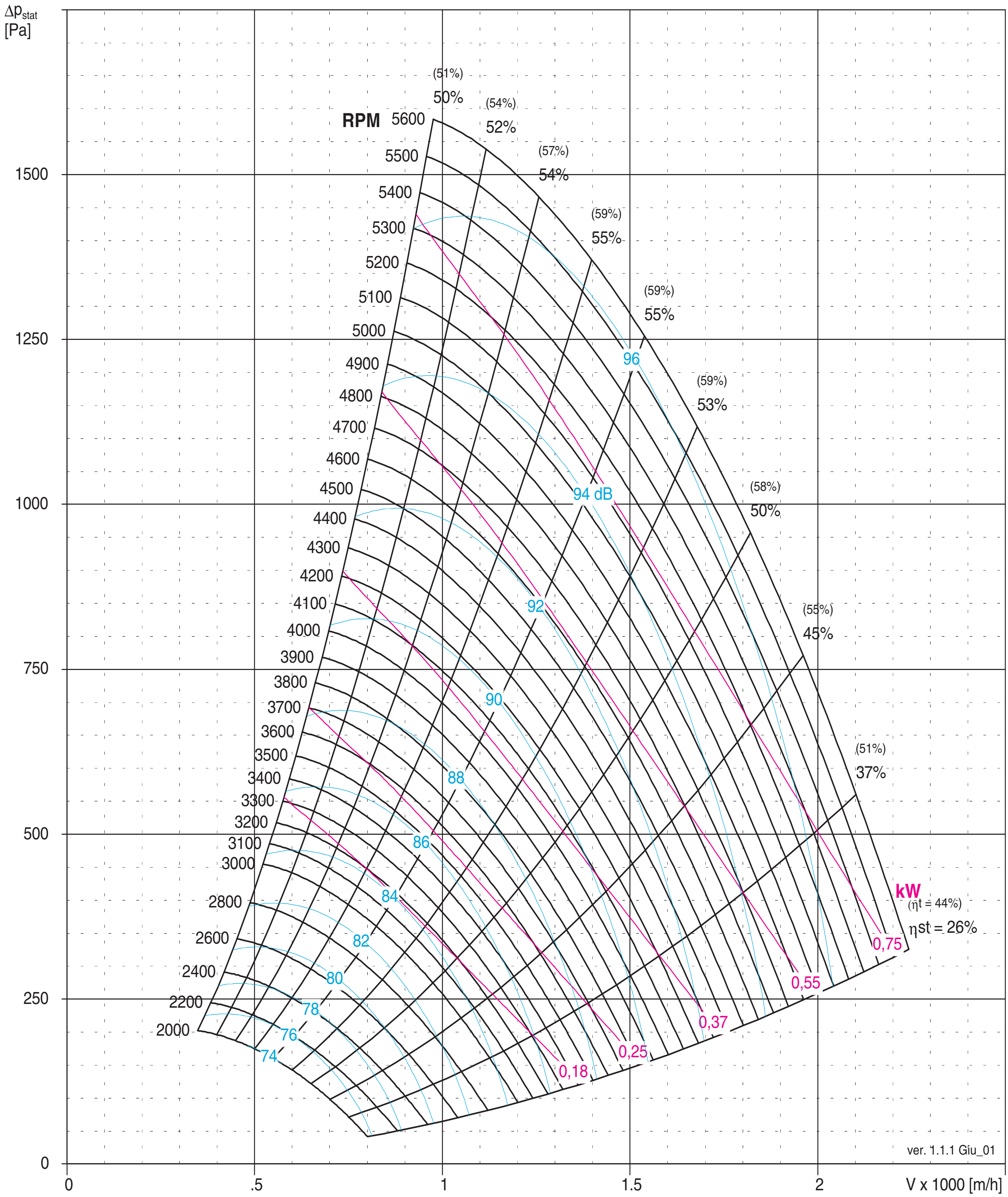


Model/Size	TE 200
Wheel Max RPM [min^{-1}]	5500
Wheel Max kW	1
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3

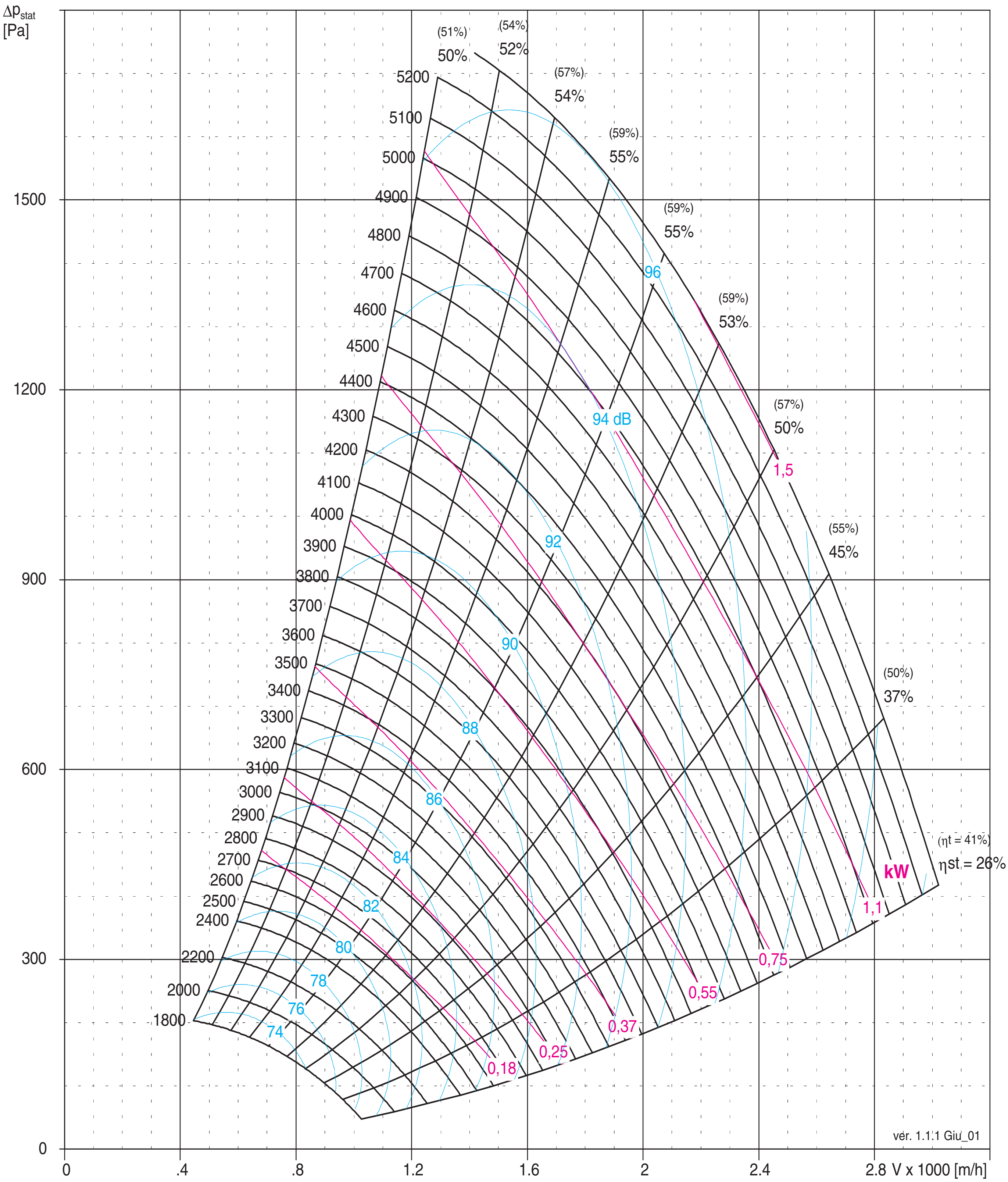
Free inlet - Free outlet

L_{W6} : Total Sound Power Level at the wheel outlet



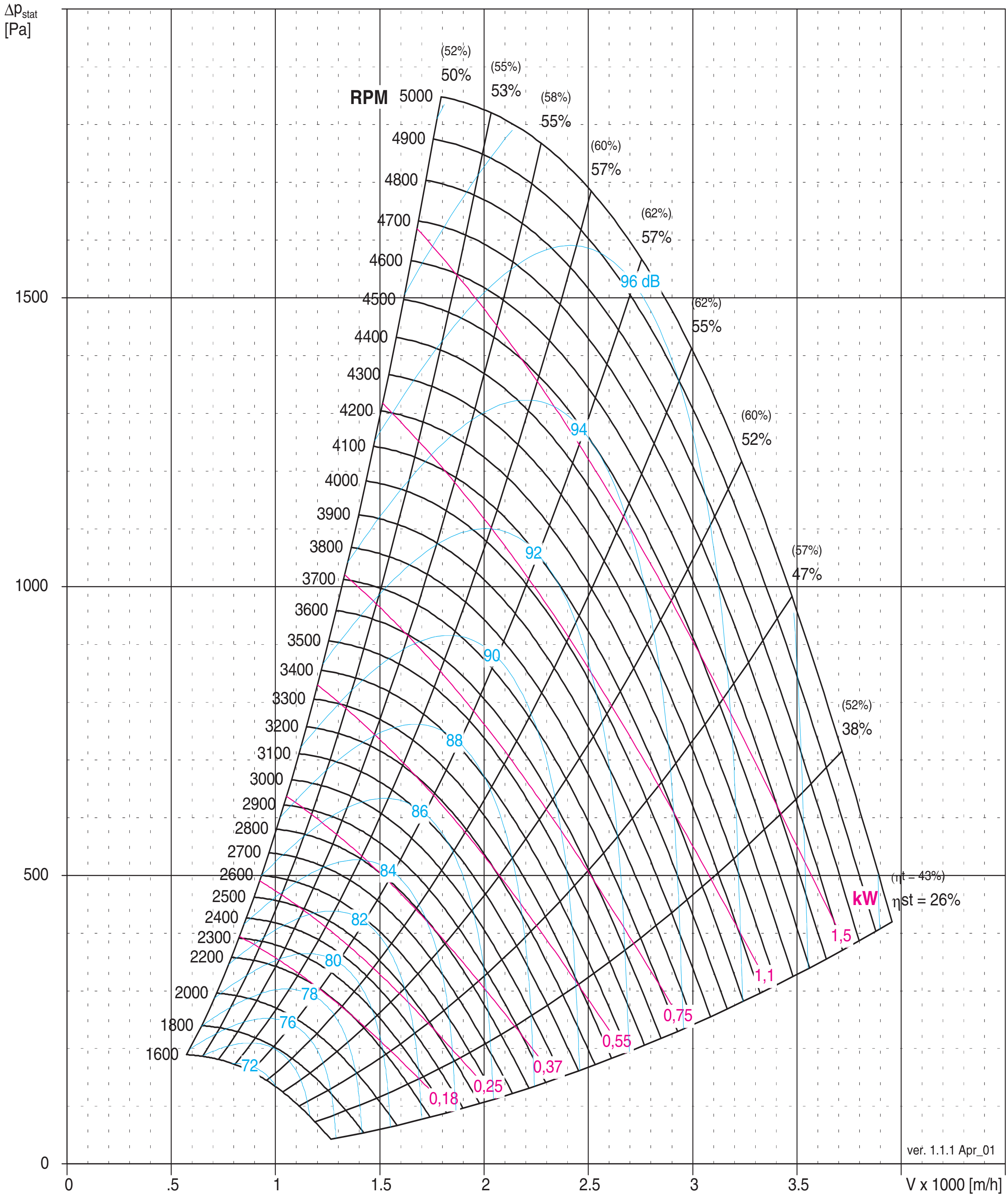
Model/Size	TE 225
Wheel Max RPM [min^{-1}]	5200
Wheel Max kW	1,5
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3
Free inlet - Free outlet
L_{W6} : Total Sound Power Level at the wheel outlet



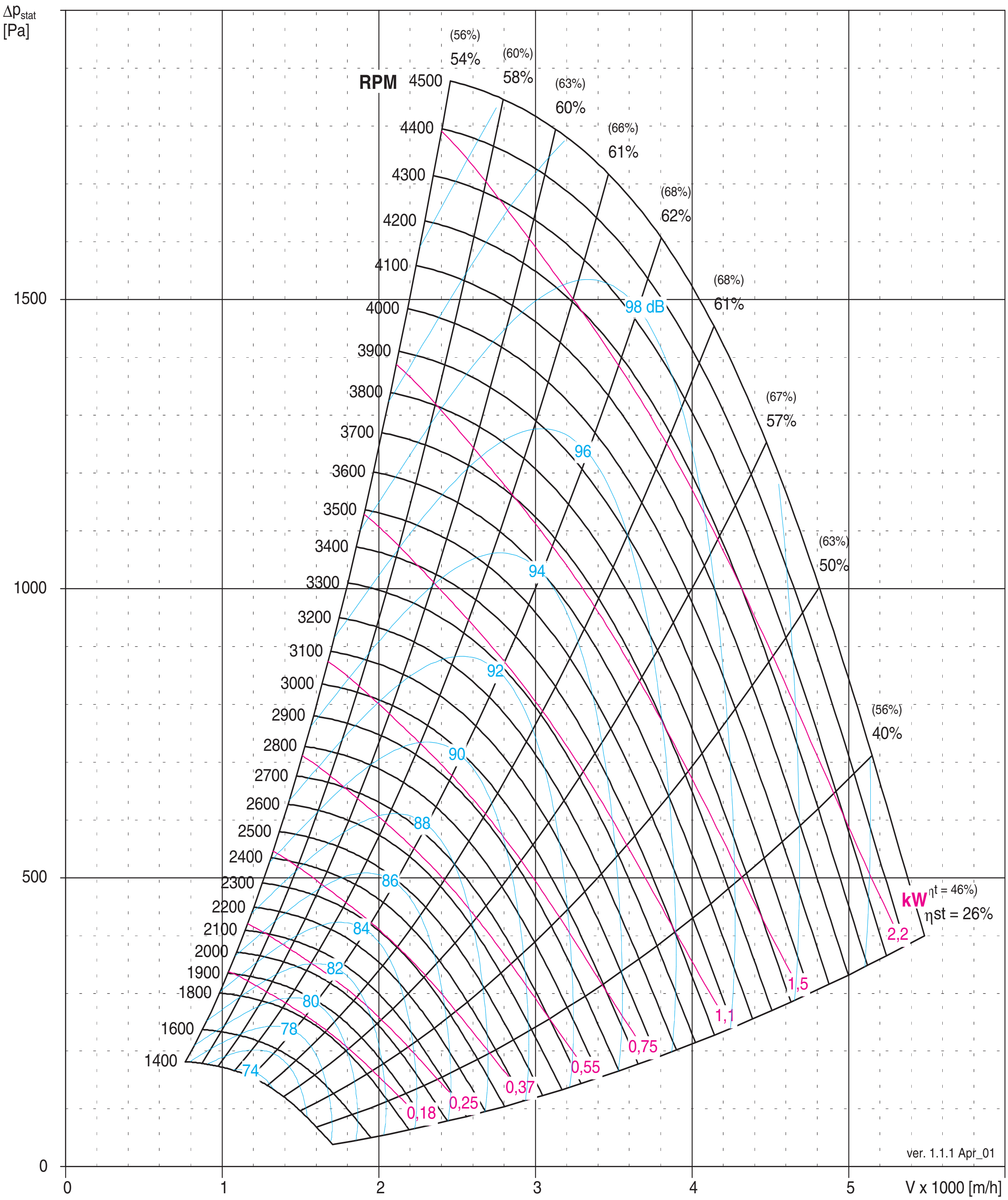
Model/Size	TE 250
Wheel Max RPM [min^{-1}]	4900
Wheel Max kW	2,25
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3
Free inlet - Free outlet
L_{W6} : Total Sound Power Level at the wheel outlet



Model/Size	TE 280
Wheel Max RPM [min^{-1}]	4400
Wheel Max kW	2,75
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3
Free inlet - Free outlet
L_{W6} : Total Sound Power Level at the wheel outlet



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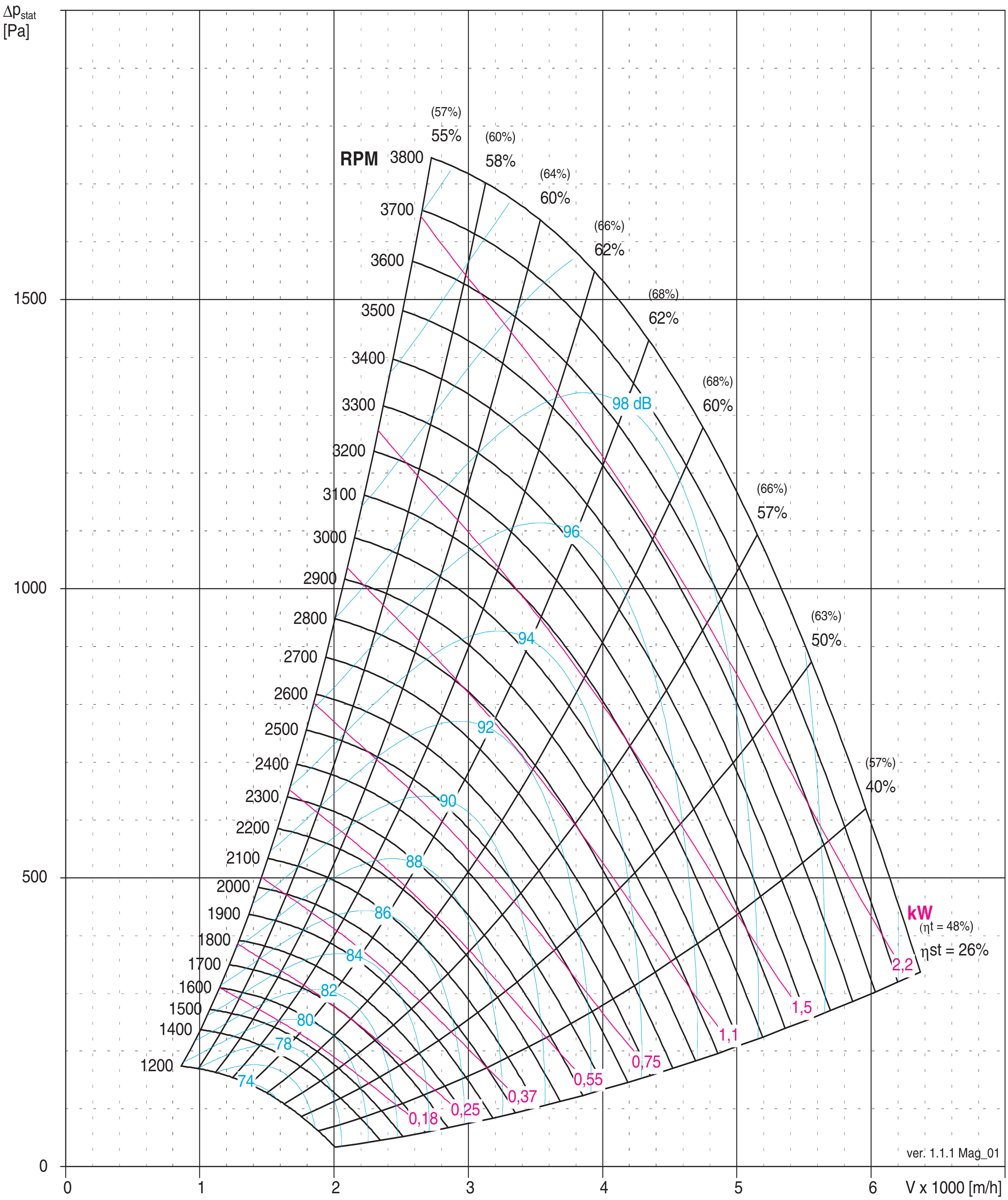
Model/Size	TE 315
Wheel Max RPM [min^{-1}]	3600
Wheel Max kW	2,5
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3

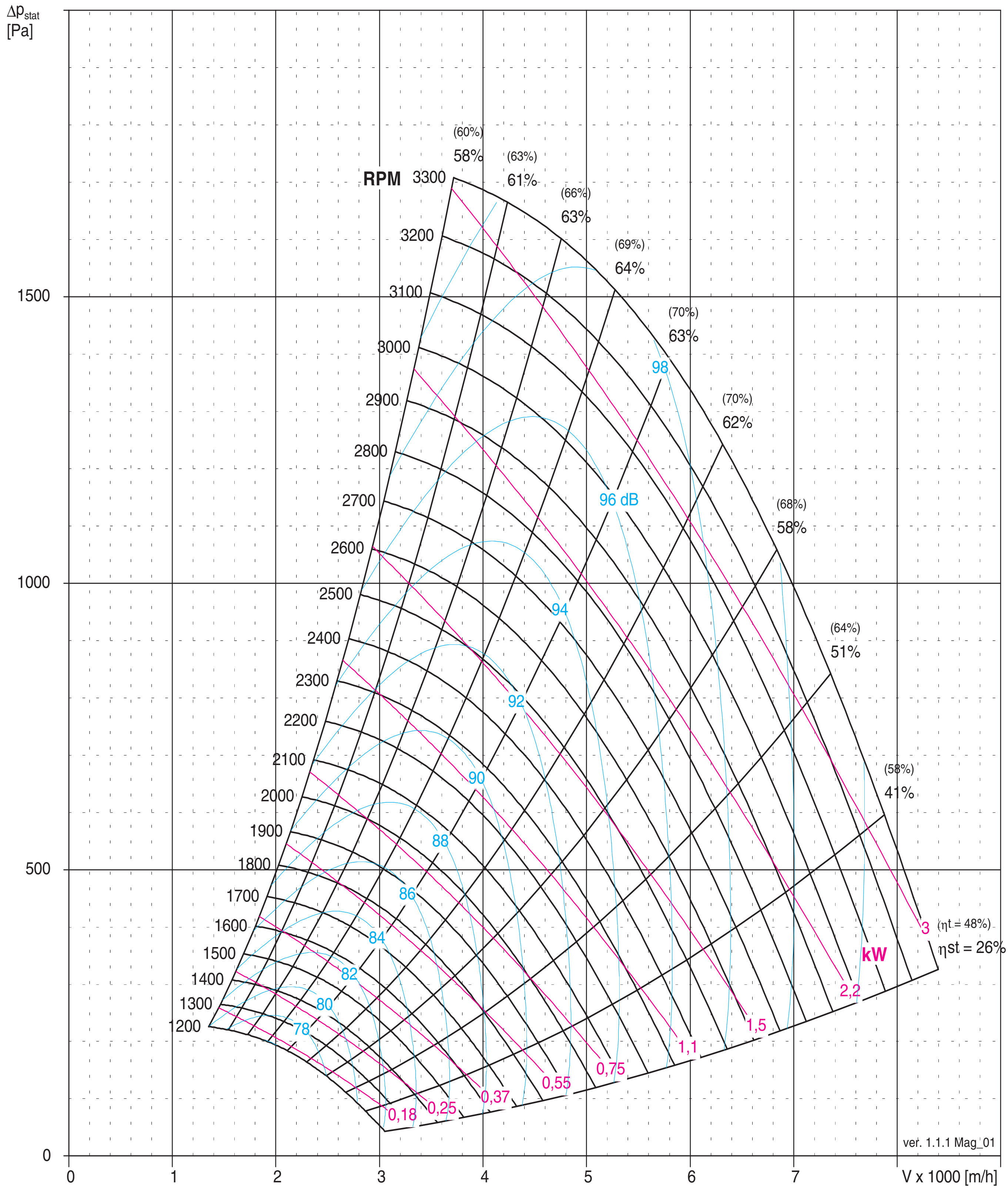
Free inlet - Free outlet

L_{W6} : Total Sound Power Level at the wheel outlet



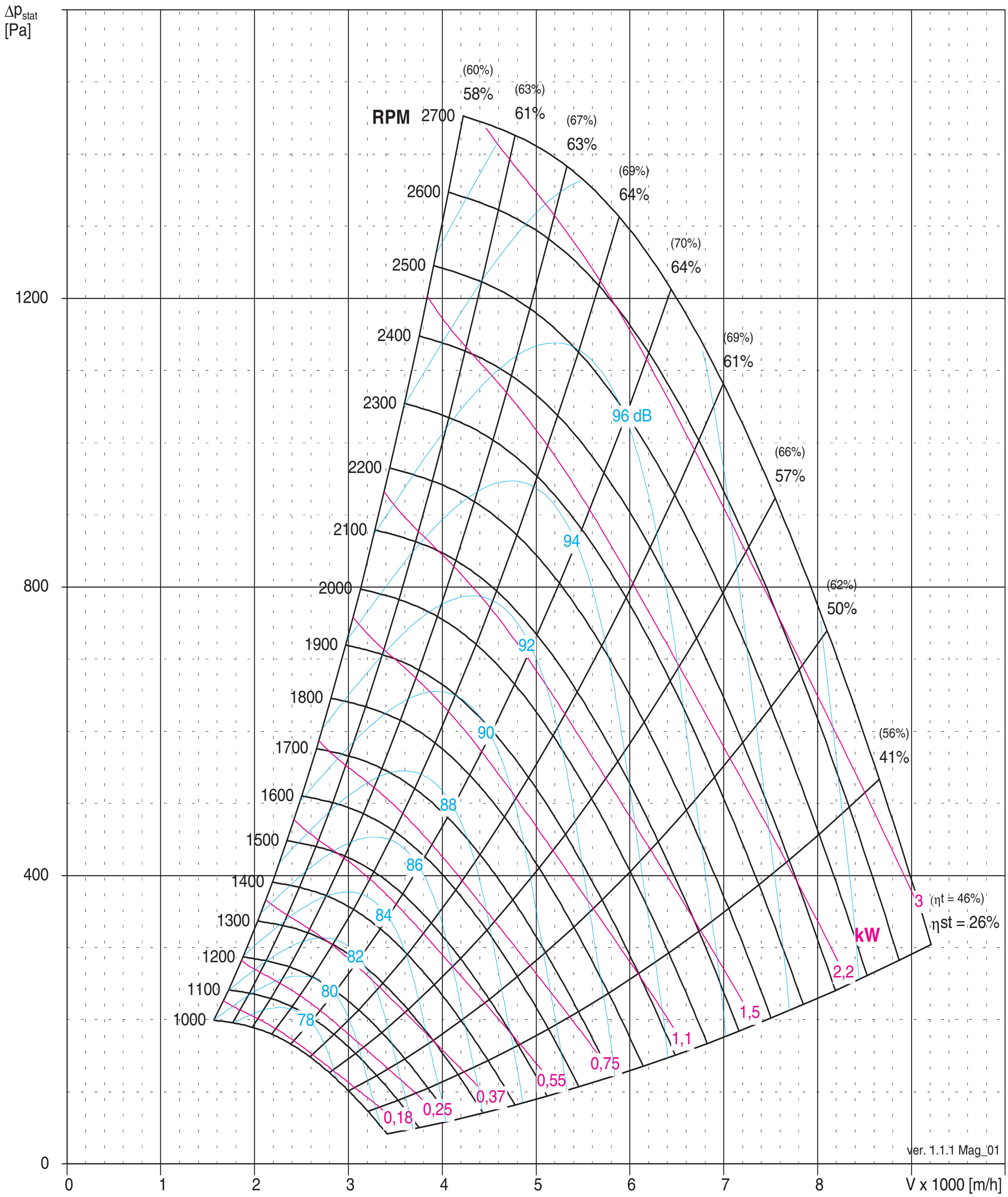
Model/Size	TE 355
Wheel Max RPM [min^{-1}]	3200
Wheel Max kW	3,5
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3
Free inlet - Free outlet
L_{W6} : Total Sound Power Level at the wheel outlet



Model/Size	TE 400
Wheel Max RPM [min^{-1}]	2650
Wheel Max kW	3,75
Wheel No. Blades	8

Fan curves plotted for air density: 1,2 kg/m^3
Free inlet - Free outlet
L_{W6} : Total Sound Power Level at the wheel outlet



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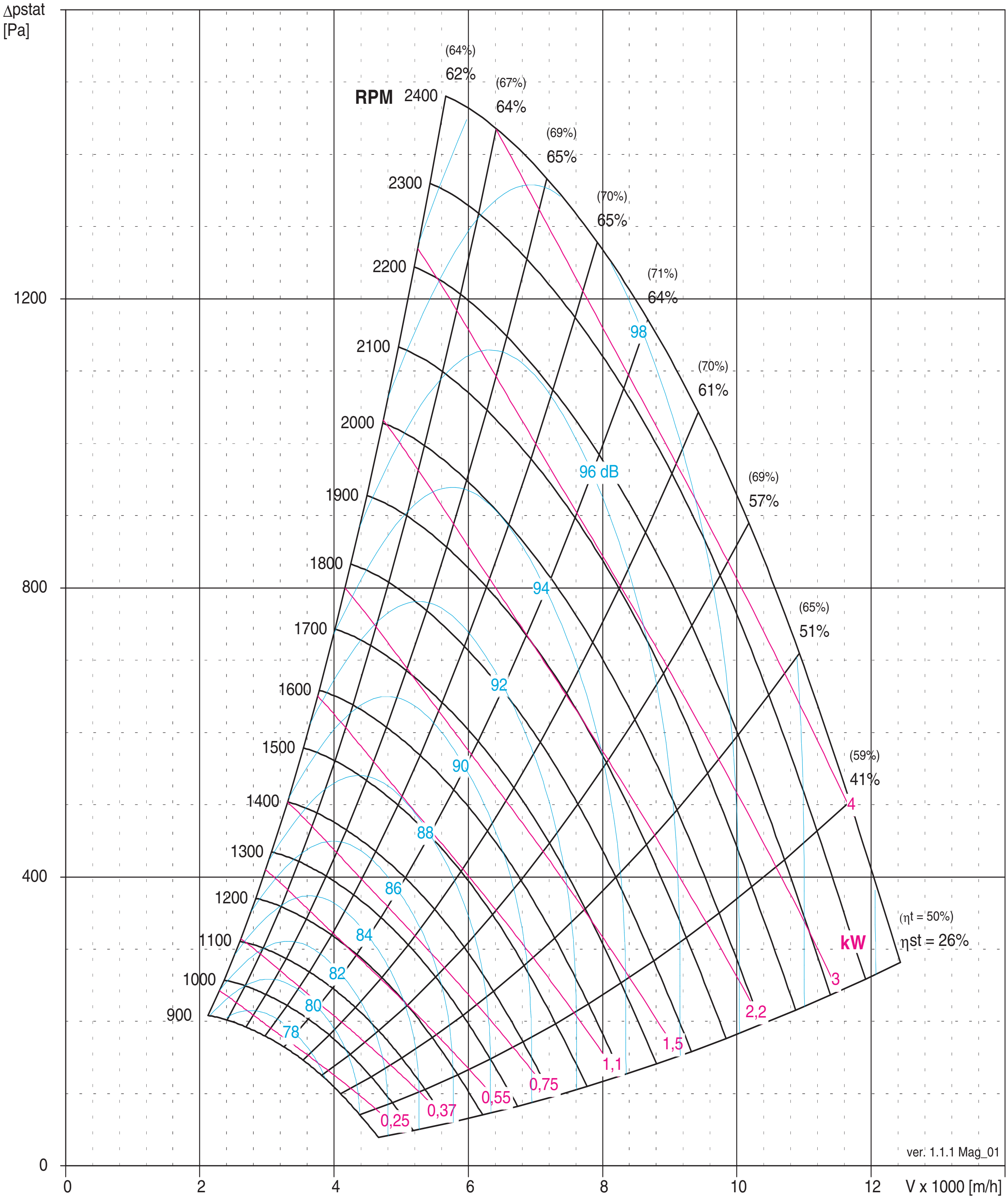
Model/Size	TE 450
Wheel Max RPM [min^{-1}]	2350
Wheel Max kW	4,5
Wheel No. Blades	8

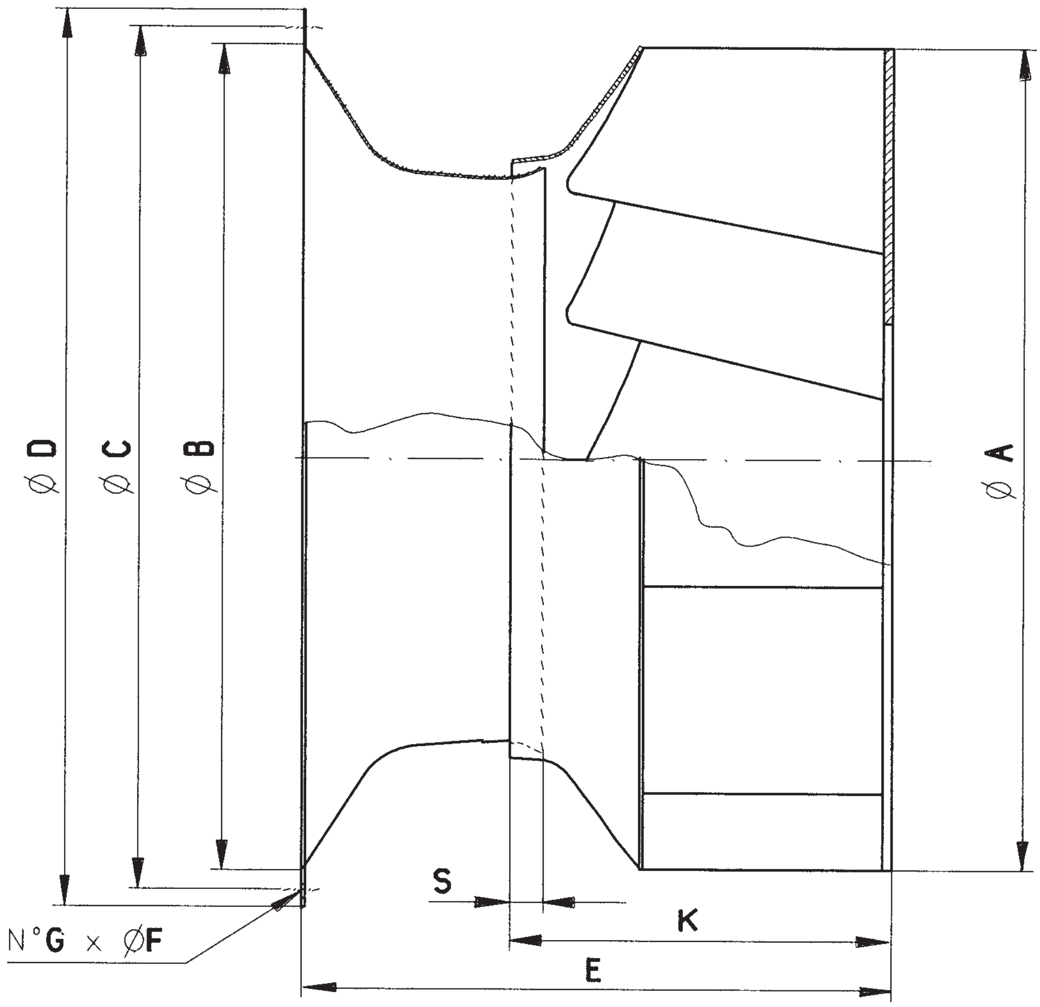
Fan curves plotted for air density: 1,2 kg/m^3

Free inlet - Free outlet

L_{W6} : Total Sound Power Level at the wheel outlet



6. WHEEL DIMENSIONS: TE 180 to 450



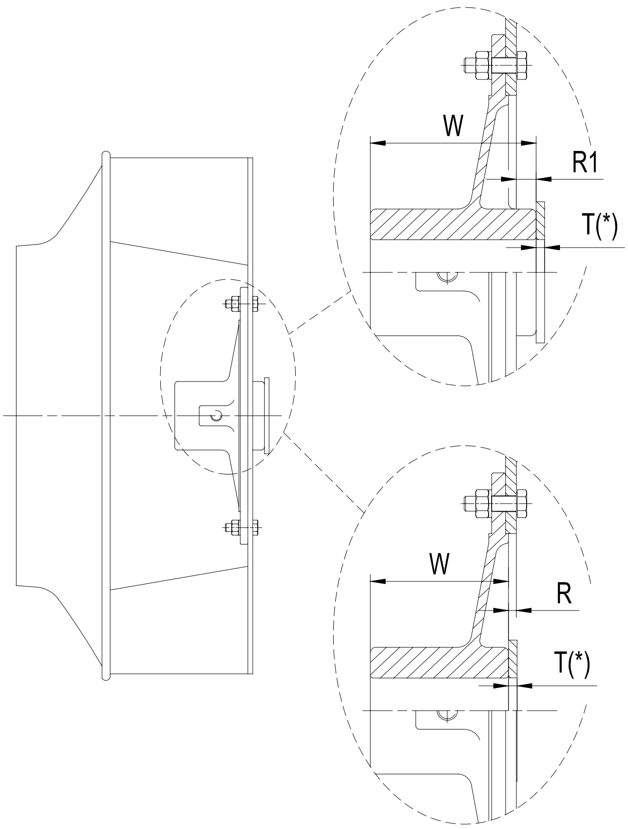
	Φ A [mm]	Φ B [mm]	Φ C [mm]	Φ D [mm]	E [mm]	Φ F [mm]	G	K [mm]	S [mm]	(*) WHEEL WEIGHT [kg]	INLET CONE WEIGHT [kg]
180	180	167	202	222	116	7,5	6	87	6	0,3	0,25
200	202	181	232	252	129	7,5	6	92	6	0,5	0,35
225	226	211	257	277	145	7,5	6	106	7	0,6	0,45
250	250	228	283	303	165	7,5	6	117	8	0,8	0,6
280	282	262	320	350	188	10	6	131	9	1,1	0,8
315	316	301	355	385	204	10	6	145	11	1,5	1,1
355	357	347	395	425	234	10	8	164	14	2	1,2
400	402	383	440	470	254	10	8	179	14	2,1	1,5
450	455	430	490	530	285	12	8	201	16	3,4	2,6

(*) WITHOUT HUB; HUB WEIGHT AND TOTAL WHEEL MOMENT OF INERTIA CAN BE FOUND ON SECTION 7.

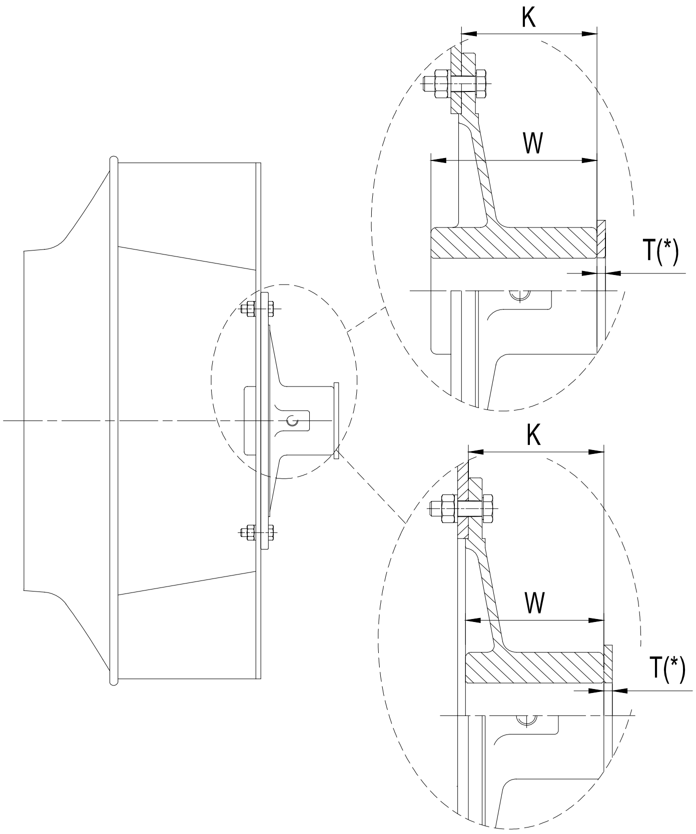
7. MOTOR SIZE FOR DIRECT DRIVEN PLUG FAN

7.1. Hub Arrangements: Internal - HI ; External - HE

WHEEL WITH
ALUMINIUM HUB



WHEEL WITH
ALUMINIUM HUB



(*) steel distance bush to insert between aluminium hub and motor shaft abutting

WHEEL Φ	MOTOR SIZE	OUTPUT POWER [Kw]	POLES	SHAFT DIAM. [mm]	**HUB** Weight [kg]	**J **** [kg m^2]	**W**	**T**	Internal - HI		External - HE
									R	**R1**	**K**
180	63 A / B	0,18 / 0,25	2	11	0,26	0,033	44	1,5	5		43
	71 A / B	0,37 / 0,55		14	0,25						
	80 A / B	0,75 / 1,1		19	0,31	0,035	54			5	
200	63 A / B	0,18 / 0,25	2	11	0,26	0,04	44	1,5	5		43
	71 A / B	0,37 / 0,55		14	0,25						
	80 A / B	0,75 / 1,1		19	0,31	0,05	54			5	
225	63 A / B	0,18 / 0,25	2	11	0,26	0,074	44	1,5	5		43
	71 A / B	0,37 / 0,55		14	0,25						
	80 A / B	0,75 / 1,1		19	0,31	0,078	54			5	
	90 S	1,5		24	0,28						

(**) TOTAL WHEEL MOMENT OF INERTIA (WHEEL+HUB)

SUBJECT TO CHANGE BY COMEFRI

GLASS REINFORCED POLYAMID WHEELS FOR PLENUM FANS - TE

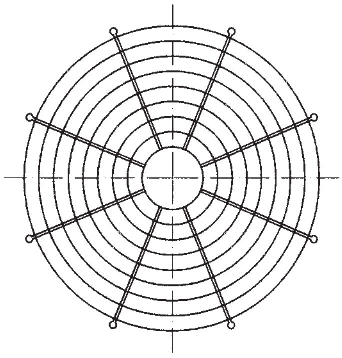
C-0043 February 2004

WHEEL Ø	MOTOR SIZE	OUTPUT POWER [Kw]	POLES	SHAFT DIAM. [mm]	HUB Weight [kg]	J ** [kg m^2]	W	T	Internal - HI R	Internal - HI R1	External - HE K
250	63 A / B	0,18 / 0,25	2	11	0,26	0,011	44	1,5	5		43
	71 A / B	0,37 / 0,55		14	0,25						
	80 A / B	0,75 / 1,1		19	0,31	0,0115	54			5	
	90 S / L	1,5 / 2,2		24	0,28						
280	71 A / B	0,37 / 0,55	2	14	0,25	0,018	44	1,5	5		43
	80 A / B	0,75 / 1,1		19	0,31		54			5	
	90 S / L	1,5 / 2,2		24	0,28						
	100 L	3		28	0,26						
315	71 A / B	0,25 / 0,37	4	14	0,54	0,036	64	3		5	51,5
	80 A / B	0,55 / 0,75		19	0,52						
	90 S / L	1,1 / 1,5		24	0,49						
	71 A / B	0,37 / 0,55	2	14	0,54						
	80 A / B	0,75 / 1,1		19	0,52						
	90 S / L	1,5 / 2,2		24	0,49						
	100 L	3		28	0,46						
355	71 A / B	0,25 / 0,37	4	14	0,54	0,052	64	3		5	51,5
	80 A / B	0,55 / 0,75		19	0,52						
	90 S / L	1,1 / 1,5		24	0,49						
	71 A / B	0,37 / 0,55	2	14	0,54						
	80 A / B	0,75 / 1,1		19	0,52						
	90 S / L	1,5 / 2,2		24	0,49						
	100 L	3		28	0,46						
	112 M	4		28							
400	80 A / B	0,55 / 0,75	4	19	0,52	0,08	64	3		5	51,5
	90 S / L	1,1 / 1,5		24	0,49						
	100 LA / LB	2,2 / 3		28	0,46						
	112 M	4		28							
	80 A / B	0,75 / 1,1	2	19	0,52						
	90 S / L	1,5 / 2,2		24	0,49						
	100 L	3		28	0,46						
	112 M	4		28							
450	80 A / B	0,55 / 0,75	4	19	1,21	0,15	54	3		8	38,5
	90 S / L	1,1 / 1,5		24	1,18						
	100 LA / LB	2,2 / 3		28	1,4		84				68,5
	112 M	4		28							
	80 A / B	0,75 / 1,1	2	19	1,21		54				38,5
	90 S / L	1,5 / 2,2		24	1,18						
	100 L	3		28	1,4		84				68,5
	112 M	4		28							

(**) TOTAL WHEEL MOMENT OF INERTIA (WHEEL+HUB)

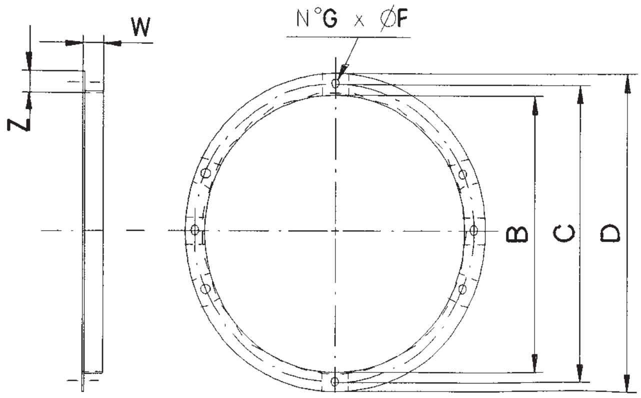
SUBJECT TO CHANGE BY COMEFRI

8. ACCESSORIES



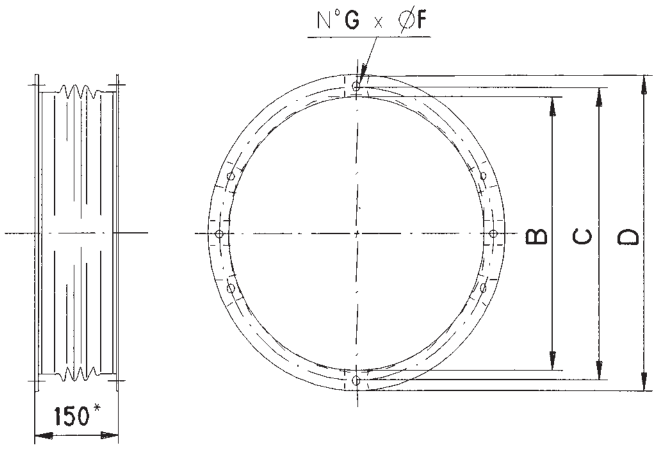
8.1. Inlet guard - ZS

Industrial safety regulations specify that reliable guard must be provided for rotating machine elements.
Inlet and outlet guard are available, according to EN 294



8.2. Inlet Flange - Z

They can be supplied separately or fitted on customer's requirement. From size 180 to 450 they are manufactured in galvanized steel. Their dimensions and drillings are given in table 9.



8.3. Flexible Inlet Connection - ZEL

The flexible connection for the inlet is manufactured with a polyester / PVC fabric and two inlet flanges - Z
Their dimensions and drillings are given in table 9.

	B [mm]	C [mm]	D [mm]	F [mm]	G [mm]	W [mm]	Z [mm]
180	183	202	215	7,5	6	25	16
200	205	232	250	7,5	6	25	23
225	229	257	279	7,5	6	25	25
250	256	283	306	7,5	6	25	25
280	288	320	348	10	6	30	30
315	322	355	382	10	6	30	30
355	361	395	421	10	8	30	30
400	404	440	464	10	8	30	30
450	453	490	513	12	8	30	30

Table 9

9. FLOW METER

The TE wheels can be fitted with a device for measuring and controlling the air volume with a 10% tolerance (normal operating conditions).

In order to estabilish the accuracy of the measuring device, each TE impeller has been tested in our state of art test laboratory.

The device consist of two or more static pressure measuring points, mounted directly into the inlet cone. The measuring points are manifolded together via a flexible ring tube. Therefore all that is required is for the single tube connected to a pressure measuring device.

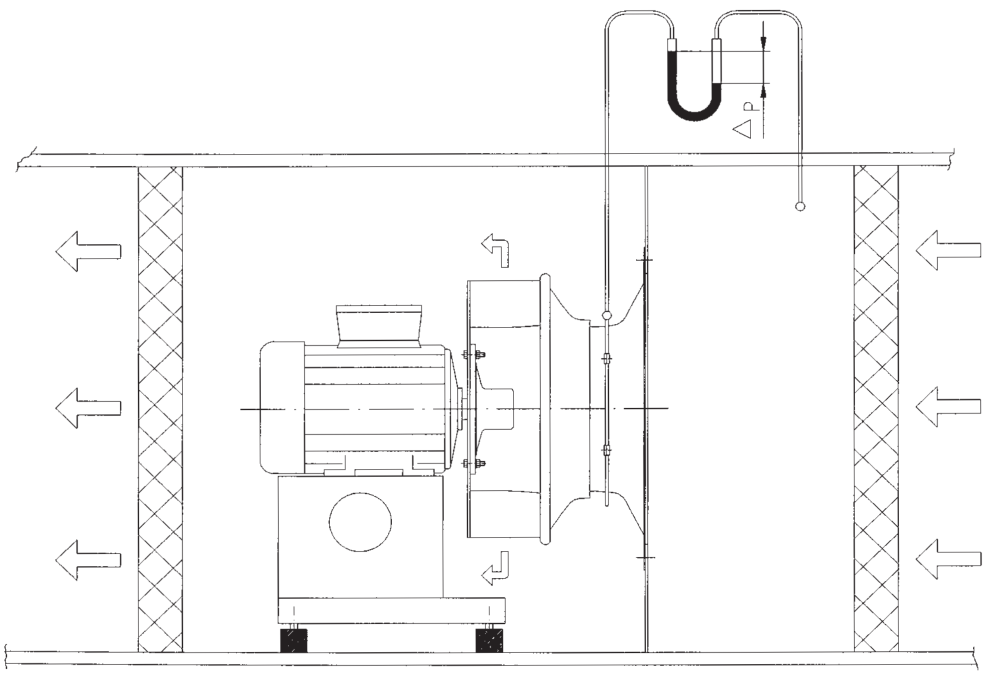
The differential pressure (Δp) measured between the inlet of the AHU and the flow measuring device (see drawing) can be converted to the volume flow by the following formula:

$$V = \mathbf{K}\sqrt{\frac{2}{\rho}\cdot(\Delta p)}$$

V	Volume flow	[m³/h]
ρ	Air density	[kg/m³] (1.2 for standard air)
Δp	Differential pressure	[Pa]
K	Calibration factor depending on wheel size	

Wheel Size	**180**	**200**	**225**	**250**	**280**	**315**	**355**	**400**	**450**
K	23	30	38	47	59	75	95	123	158

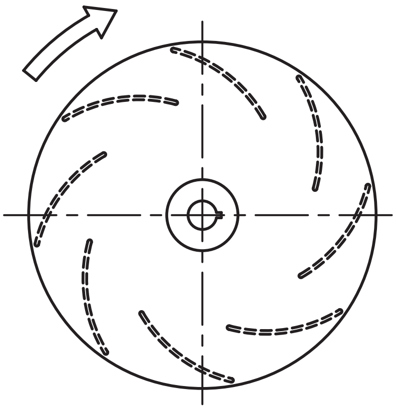
COMEFRI's TE wheels are available with the Flow Meter measuring device all ready factory installed, otherwise a Flow Meter Kit device can be delivered.



10. ROTATION

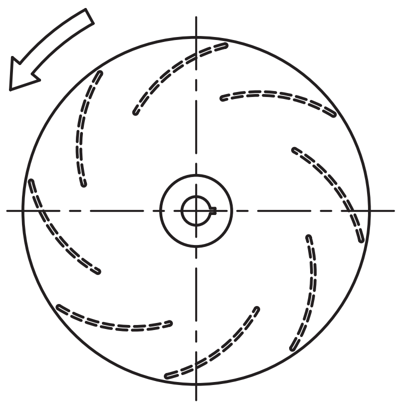
The wheel direction of rotation, seen from drive side is:
a) clockwise, if indicated with the symbol RD, or
b) counter-clockwise if indicated with the symbol LG

RD – CLOCKWISE



View Drive Side

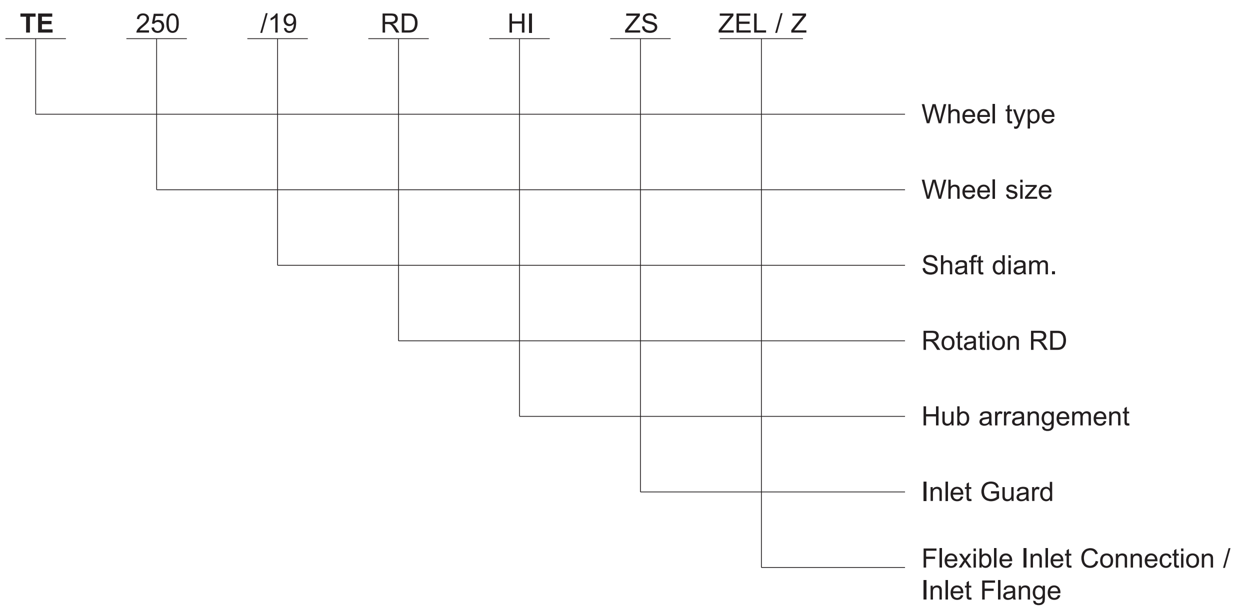
LG - COUNTER CLOCKWISE



View Drive Side

11. PRODUCT IDENTIFICATION

11.1. Wheel reference Code / Example



Notes

We reserve the right to modify fan designs or dimensions in order to enhance our products.

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