皮带传动离心风机

Radial Fans, belt driven

rosenberg® ECOFIT ETRI

THE AIR MOVEMENT GROUP

担保的宗旨

客户负责风机选型、风机的安装和操作。根据有效条款 VII 段和购买条件，提供产品担保，不包括其他要求。

担保不适用于下列情况：

购买者或第三方的不恰当使用，装配或安装错误，正常磨损，违规操作，不正确的维护保养，不适宜的通风介质，错误安装，不适宜的底座，化学及电气的影响超出厂商责任范围。

如果在厂商交货时，产品存在质量问题，客户有权要求更换风机或其他部件。厂商也可以在合理的时间内修好产品，一有问题顾客应尽早通知厂商。

在保修期的维修与更换，可访问我们的网站或直接联系我们的子公司。

机械安全的信息

洛森伯格风机是符合EC评议会指令（机械，低电压，电磁兼容性和在ATEX指令下的潜在危险区），这种产品标有CE标签和一个制造商的合格声明。

风机的潜在危险评估和必要的技术安全措施是按照VDMA标准，图表编号24167：风机，安全性要求和相关的欧洲标准。

为满足欧共体的方针要求，在安装过程中使用的操作手册包含了其他的安全方面的考虑。

Warranty Guidelines

The customer is responsible for the project design, selection and operation of the fans. The supplier gives warranty for faulty products, excluding further claims, in accordance with paragraph VII of the valid terms and conditions of business.

Warranty will not given in the following instances:

Unfitted or inappropriate usage, incorrect mounting or faulty installation by the purchaser or a third party, normal wear and tear, incorrect or negligent handling, improper maintenance, unsuitable operating material, faulty installation, unsuitable ground and chemical, electrochemical or electrical influence - as long as they are not the responsibility of the supplier.

If the goods delivered from the manufacturer are faulty, the the customer has the right to receive a replacement or replacement of the faulty parts up to the maximum value of the purchase price. The manufacturer also has the right to get the product repaired within a reasonable time period. The manufacturer must be informed immediately in the case of damage.

The obligation to replace additional faults is herewith excluded. Our general terms of business are the basis for all further agreements for example: time periods to repair or replace. The general terms of business are available on our website www.rosenberg.eu or direct from one of our sales representatives.

Information on Machine Safety

Rosenberg fans are in conformity with EC council directives (machinery, low voltage, electromagnetic compatibility and in potential hazardous areas with the ATEX directive). The products are marked with a CE label and delivered with a manufacturers declaration respectively a declaration of conformity.

The assessment of the potential dangers of the fan and the necessary technical safety measures are in accordance with VDMA standard, sheet number 24167: fans; Safety requirements and relevant harmonized European standards.

The operation manual contains additional safety precautions to be considered during installation to fulfil the requirements of the guidelines of the European Community.

误差、标准、认证

我们的目标是为客户生产高质量的产品并提供优质的服务。

因此，在您——我们尊敬的客户和我们之间保持一个持续的信息沟通和良好合作对于我们共同实现提升产品品质和服务质量非常重要。

用负责任的工作团队操作使用现代化的测试装置和数控设备以生产高质量的产品和环境保护措施是我们的理念。

我们在设计和生产空气传动设备时使用的大量的知识是按照 DIN EN ISO 9001 和 RLT 制造协会的要求并取得认证的。

Tolerances, standards, QMS

Our goal is to produce high quality products and provide excellent customer support.
Thus a continuous flow of information and good cooperation between you, our dear customers, and us is important to jointly achieve a continuous development of our products and maintain quality.

Modern test chambers and equipment, as well as computer controlled production handled by responsible working teams are part of our philosophy, as is the control of high quality and environmental protection measures.

Our extensive knowledge in the design and production of air movement products is shown by our certification according to DIN EN ISO 9001 and by our membership to the RLT asociation of manufacturer.

洛森博格风机达到 DIN24166 的要求

Rosenberg fans meet the requirements of DIN 24166

DIN 24166	公差 1 / tolerance 1	公差 2 / tolerance 2
风量 / volume flow	± 2,5%	± 5%
压力 / pressure increase	± 2,5%	± 5%
功率 / power	+ 3%	+ 8%
效率 / efficiency	- 2%	- 5%
A 声功率级 / A-weighted sound power level	+ 3dB	+ 4dB
	从尺寸 450 / from size 450	到尺寸 400 / up to size 400

功率数据是按照 DIN24163，噪音数据是按照 DIN45635 得来的。

The power data are determined accordig to DIN 24163 and the sound data according to DIN 45635.

综述

Overview

HRZ
带高效后倾叶轮双进风皮带传动离心风机

HRZ
Belt driven radial fan double inlet with backward curved high efficiency impeller.

HRE
带高效后倾叶轮单进风皮带传动离心风机

HRE
Belt driven radial fan single inlet with backward curved high efficiency impeller.

TRZ
带镀锌前倾叶轮双进风皮带传动离心风机

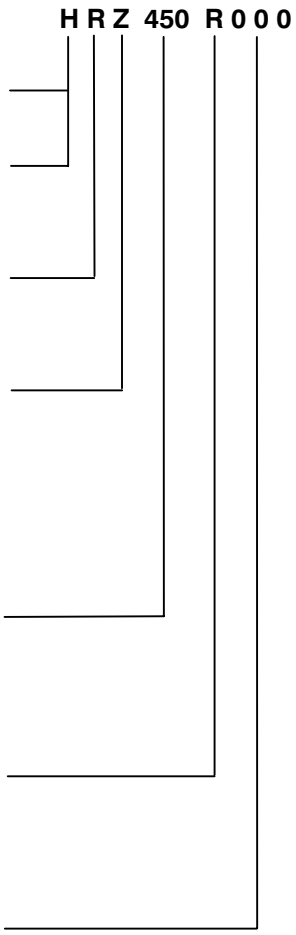
TRZ
Belt driven radial fan double inlet with forward curved galvanized sheet steel impeller.

TRE
带镀锌前倾叶轮单进风皮带传动离心风机

TRE
Belt driven radial fan single inlet with forward curved galvanized sheet steel impeller.

参考型号

reference code



H 后倾叶轮
backward curved impeller

T 前倾叶轮
forward curved impeller

R 皮带传动
belt driven

Z 双进风
double inlet

E 单进风
single inlet

450 叶轮直径
impeller diameter

R, L 右/左手旋转
right / left hand rotation

000 进一步说明
further classification
例如 / e. g.
带闭式圆管 / with closed circular pipe
设备类别2 / equipment categorie 2

总则

洛森博格离心风机是由一个持续的、系统的开发工艺生产的，适用于现代通风和空气处理机组的要求，其特别之处在于：

- 高效，运行经济
- 运行安静，低操作噪音
- 壳体模块化设计，不同系列之间可以互换
- 设计紧凑，根据DIN 323 R20进行设计，尺寸符合叶轮外径

壳体

整个蜗壳由镀锌板制成。侧板带有固定孔以便于和框架连接。框架和进风导风圈用螺栓螺母与侧板连接。

叶轮

一般来说，我们的带有内置轴的叶轮是根据DIN / ISO1940中的Q2.5或6.3质量要求进行动平衡和静平衡。质量标准是根据叶轮的尺寸判断。

TRZ/TRE以及TRZ Ex/TRE Ex系列的叶轮是由镀锌板制成；HRZ / HRE系列的叶轮由普通钢板制成，表面喷塑。

旋转方向

标准旋转方向是站在驱动侧，叶轮为顺时针转动。错误的旋转方向会导致电机过载。所以在使用前检查风机的旋转方向是必不可少的。

进风导风圈

进风口符合空气动力学设计并且保证空气在进入叶轮时的完美组织。

所有HRZ/HRE系列以及TRE/TRZ系列中尺寸从400开始，其导风圈为镀锌板制成。TRE/TRZ系列中尺寸从160-355，其导风圈为聚丙烯制成。

Generally

Rosenberg radial fans are produced in a continuous, systematic development process especially for the demands of modern ventilating and air handling units. The specific characteristics are:

- High efficiency for economical operating mode
- quiet running, low operating noise
- interchangeable from one series to another because of the uniform casings
- compact design with graduation of the components according to DIN 323 R20. The size corresponds to the outside diameter of the impeller

Casing

The hole spiral casing is made of galvanized sheet metal. The side plates with holes for fixing the stand are lock -seamed with the sheet casing. The stands and the inlet cones are attached to the casing by screw nuts which are mounted on the side plates.

Impeller

Generally our impellers with built-in shafts are statically and dynamically balanced on precision machines according to quality standard Q2,5 or 6,3 of DIN/ISO1940. The quality standard depends on the size of the impeller.

The impeller of fan series TRZ/TRE as well as TRZ Ex/ TRE Ex are manufactured out of galvanized sheet steel and series HRZ/HRE from black steel with powder coated

Direction of rotation

The standard direction of rotation of the impellers is clockwise by looking on the actuation. Wrong direction of rotation can overload the motor, therefore it is essential to check the direction of rotation before use.

Inlet cones

The bolt-on inlets are aerodynamically shaped and guarantee a perfect inlet stream onto the impeller.

Inlets for the whole range of type HRZ/HRE and TRE/TRZ from size 400 are made in series of galvanized sheet metal. Inlets for the type TRZ/TRE sizes 160-355 are made in series of polypropylene.

TRE/TRZ Ex 160 – 355会使用导电复合材料的导风圈。在用于有潜在爆炸性气体而不使用镀锌铁板制作导风圈时，其表面镀铜。

For TRE/TRZ Ex 160 - 355 a conductive synthetic material is used. The inlet cones out of galvanized sheet metal for usage in potentially explosive atmospheres are coated with a copper strip.

轴

在安装皮带轮时，轴两端的直径设计按照DIN 748 (表1)附带按照DIN 6885 (表1)设计的键槽。轴上涂抹蜡状物以防腐

Shaft

To fix the V-belt pulleys, the diameters of both shaft ends are standardized to DIN 748 (sheet 1), with keyways to DIN 6885 (sheet 1). A wax-type coating protects the shaft against corrosion.

轴承的应用

低噪音高精度滚珠轴承，理论设计工作寿命L_{h10}至少20,000小时。其标识的最大功率和皮带轮最大直径必须遵守。

倾斜和静态失调可以通过径向轴承宽松度C3（根据DIN 620-4）和球面轴承表面来补偿。轴承通过一个支撑在轴旋转方向并且带有平头螺栓保护的偏心应力环来固定。为了避免由于摩擦产生的腐蚀，在内滚道和应变环上会镀一层很薄的锌铁合金。带有内置轴承的风机在输送洁净空气时的温度范围可以在-20 ° C (-4 ° F) 至 +80° C (176° F)。严格遵守皮带装置的通用组装和服务手册可以确保他们的长期质量。

TRZ 160-710 / TRE 200-630
HRZ 180-710 / HRE 200-630
安装在3个支撑架的外壳的带沟滚珠轴承是完全密封并免于维护的。外包裹的橡胶环可以减少振动和碰撞的损害。
TRZ / TRE 710-1000
HRZ / HRE 710-1000
安装在铸铁外壳内的带沟滚珠轴承（支撑轴承）是完全密封并免于维护的。一体化的轴承允许完全利用安装轴承的承载力。
所有轴承座上都有注油口以二次加油。注油口上有塞子以保护注油口。

Bearing application

The low noise precision ball bearings are designed for a theoretical service life L_{h10} of at least 20.000 working hours. The indicated maximum power and diameters of the V-belt pulleys have to be observed. Tipping and static misalignments can be compensated by the radial bearing slackness C3 (according to DIN 620-4) and a spherical bearing surface. The bearings are fixed with eccentric straining rings which are braced in direction of rotation of the shaft and guarded with a grub screw. To avoid frictional corrosion the inner raceway and the straining ring is plated with a thin alloyed ZnFe coating .With the built-in bearings the fans are suitable for moving clean air at temperatures ranging from -20 °C (-4 °F) to +80°C (176°F). Strict observance of the general assembly and service instructions for belt drives ensures their long-term quality.
TRZ 160-710 / TRE 200-630
HRZ 180-710 / HRE 200-630
The grooved ball bearings in the 3-branched strut housings are completely sealed and maintenance-free. A wraparound rubber ring reduces vibrations and bumps.
TRZ / TRE 710-1000
HRZ / HRE 710-1000
The grooved ball bearings in the rugged cast-iron casings (pedestal bearings) are completely sealed and maintenance-free. The one-piece bearing housing allows full utilization of the bearing capacity of the mounted bearing. All housings are equipped with lubricating bore holes for the possibility of secondary lubrication. As protection the lubricating bore holes are closed with a stopper.

轴承支撑

尺寸小于等于315的装备牢固的3支撑架，从尺寸355到630装备牢固的4支撑架，其支柱为镀锌铁制成。

从尺寸710到1000装备牢固的焊接框架。根据需要，这种型式的框架也可以用于比这尺寸更小的风机。

Bearing support

Up to size 315 are equipped with stable 3-branched, from size 355 to size 630 with stable 4-branched strut housings made of galvanized sheet steel.

From size 710 to 1000 is equipped with a stable welded construction. This type is available for smaller sizes on request.

电机和电气连接

标准IEC三相电机，型式IMB3，防护等级IP55，400V/50Hz，绝缘等级F。电机装有一个PTC热保护器并适合用变频器运行。

在电机初次运行前以及在其维护时，必须遵守制造厂商的关于电机现场防护的详细的操作使用手册。

电机接线盒易于进入。电机的接线必须按照符合当地法规的接线图。如果使用变频器运行，请参考操作手册。

电机的选择

为了补偿皮带传动系统和进风导风圈的损失，您必须考虑以下系数f_p来增加轴输出功率：

$$P_m = P_W \times f_p$$

P_m 电机功率 / motor power [kW]
P_W 轴功率 / shaft power [kW]

型号 180 – 250 $f_p = 1.25$
型号 280 – 450 $f_p = 1.15$
型号 500 - 1000 $f_p = 1.12$

风机型号为HRE/Z最大质量惯性力矩为6kg/m^2，TRZ为15kg/m^2。任何型号的启动时间为少于5秒。对于标准电机的最长启动时间为10秒。

所以为了电机的安全启动，必须考虑其运行环境。

当电机直接启动时，启动电流会达到运行电流的6倍以上。机械应力会达到3倍以上。为了避免任何故障，风机选型必须遵守以下最大电机消耗功率：

！所用的数据是适用于机械平衡时的数据！
必须尊重电力供应公司的准则和指令（通常大于3kW的电机必须考虑平滑启动。）

Motor and electrical connection

Standard IEC three phase motors in size IMB3, protection class IP55, 400V/50Hz, insulation class F. The motors are equipped with a PTC thermo protector and suitable for operation with frequency converter.

Before initial operation and during maintenance, the manufacturer's detailed instructions regarding motor protection installations which are required on site, have to be followed.

The motor wiring box is easily accessible. The motor has to be connected according to the wiring diagram under consideration of the local guidelines and directives. In case of operation with frequency transformer, please refer to operation manual.

Motor selection

To compensate the losses of the belt drive and inlet, you must multiple the effective shaft output by the factor f_p below:

The mass moment of inertia of the fan type HRE/Z is max. 6kg/m^2, of TRZ max. 15kg/m^2. The start up time is therefore for any types less than 5 sec. The maximum allowed start up time for standard motors is about 10 sec.

Therefore a safe start up of the motor is observed if the operating conditions are considered.

When the motor is started directly the resulted starting current can be 6 times higher as in normal operation. The mechanical stresses can be up to 3 times higher. To avoid any failure the following max motor power consumptions have to be observed:

! The indicated data refer to the mechanical stability! The guidelines and directives of the electric supply company have to be respected (usually motors bigger than 3kW have to be started by smooth start).

	160	**180**	**200**	**225**	**250**	**280**	**315**	**355**	**400**
最大电机功率 max. motor power	3 kW	3 kW	3 kW	3 kW	3 kW	4 kW	4 kW	4 kW	4 kW

	450	**500**	**560**	**630**	**710**	**800**	**900**	**1000**
最大电机功率 max. motor power	5,5 kW	5,5 kW	5,5 kW	7,5 kW	7,5 kW	11 kW	11 kW	11 kW

特别是大电机，这里建议使用星三角启动方式。交替式离合器，滑动轮毂或者其他的方式是可以用于平滑启动。

速度控制

可以通过一个适合的速度控制系统来达到现场所需最适合的工作点。

可以通过用变频器更改频率来更改速度。

必须遵守电机的最大频率。

在频率高于电机的f_{max}时会导致热超载并且温度传感器会在发热一段时间后作用。

对于所有的风机，其变频器上的截止频率均调节为50Hz。

在紧急情况或变频器故障的情况下，所有风机均可以在400V, 50Hz的主电源下运行。

当使用变频器来运行电机时，电压增幅得不超过500V/µs。根据不同型号的变频器以及变频器与电机之间的电缆距离，需额外增加某些设备，例如滤波器。

It is advisable to use star-delta starting especially for big motors. Alternatively clutches, sliding hubs or other methods can be used for smooth starting.

Speed control

The required optimum duty point of the unit on site can only be achieved with a suitable speed control system.

The speed is changed by changing the frequency with a frequency converter.

The max. frequency of the motor must be observed

At higher frequencies than f_{max} the motor will thermally overload and the temperature sensor will react after a certain period of heating up.

The cut-off frequency adjustable on the frequency converter is 50Hz for all fans.

In case of emergency service or failure of the frequency converter, all fans can be operated at 400V, 50Hz main supply.

When the motors are operated by frequency converter the max. speed of voltage increase of 500V/ µs should not be exceeded. Depending on the type of frequency converter, and the length of the cable between motor and frequency converter, additional components must be provided, such as a sinus filter.

皮带传动

三角皮带

通过专业人员的正确选型，三角皮带是一种经济的、有较长使用寿命和低维护成本的皮带。不管是什么样的条件，适合的皮带和皮带轮结构可以通过软件选出。

对于无故障运行，拉力的说明书中的皮带的绷紧值和间隔是必须的。

平皮带

在较高线速度的时候，平皮带装置的效率要高于三角皮带。

由于平皮带的磨损小，所以特别适合有严格卫生要求的地方。对保养的要求较高（拉力说明，校准）。

尺寸按照要求选取。

意外接触的防护

风机是按照箱体内安装来建造的，并且标准配置的风机是没有手指防护装置的。

在初次运行前，必须安装和连接所有的保护装置。防护措施必须按照DIN EN 292 （“器械分开保护”，“保全措施技术”），以及DIN EN 294 （“意外接触的防护”）执行。

Belt drive

V-belt

V-belts are economic, long life and low-maintenance when professionally dimensioned. Regardless of the application conditions the suitable belt and pulley configuration can be identified by a software program.

The tighten values and intervals as indicated in the tension specification are required for a trouble free operation.

Flat belt

Flat belt drives exhibit a higher efficiency than V-belts at a higher peripheral speed.

They are especially suitable for strict hygienic applications as a result of the minimum abrasion. The maintenance requirements (tension specification, alignment) are higher.

Dimensioning on request.

Protection against accidental contact

The fans are constructed for installation in units and therefore as a standard are not equipped with a finger protection.

Before initial operation all required protection components must be installed and connected. The protective measures must be executed according to DIN EN 292 (“separative protection appliances”, “technical protective measures”), resp. DIN EN 294 (“protection against accidental contact”).

爆炸防护

在03年7月1日后所有安装在危险区域的风机必须遵守94/9/EC (防爆指令100)的推荐。按照发生爆炸事件的概率，潜在的爆炸性大气被分为0, 1, 2区域

Explosion protection

All fans which are installed in an explosion hazardous area after 01.07.03 must comply with the recommendations of 94/9/EC (Atex 100). The potentially explosive atmospheres are divided into zones 0, 1 or 2 according to the probability of occurrence.

区域 zone	爆炸事故 / explosion hazard	根据VDMA 24169的要求，避免着火源的方法 ignition sources to be avoided according to VDMA 24169
0	不变或长期的 constant or longterm	预期很少有故障 with breakdown anticipated rarely
1	偶尔有 occasional	预期经常有故障 with breakdown anticipated frequently
2	很少或短时间 rare or short term	正常运行 with normal operation

为了确定这些区域，爆炸性其他将被输送出去并且装置区域中的风机将被分开考虑

To determine the zones, the explosive atmosphere to be conveyed and the installation area of the fans are to be regarded separately.

坚决遵守94/9/EC里关于设备种类2（用于区域1）或设备种类3（用于区域2）中风机的分类所主张的标准由制造商决定。在一个有潜在爆炸性大气的装置的操作工必须符合1999/92/EC （防爆指令137）的要求。

The responsibility of adhering to the standards laid down in 94/9/EC for fans classified in equipment category 2 (for usage in zone 1) or equipment category 3 (for usage in zone 2) is left to the manufacturers. The operator of a installation with potentially explosive atmosphere has to meet the requirements of 1999/92/EC (Atex 137)

根据Ex – RL的推荐，通风系统中的风机必须由专家进行测试。以下着火源可以考虑使用标准风机：

According to Ex-RL recommendations a ventilation system with fans must be tested by specialists. The following ignition sources are to be considered with standard fans:

- 热表面，例如固定的叶轮或从轴承处得来的摩擦热。
- hot surfaces e.g. frictional heat as a result of a fixed impeller or from the bearing.

- 摩擦、研磨或者火花冲击，例如旋转的叶轮和风机的其他部件接触。当风机材料是根据VDMA 24169部分1来组合时，着火的威胁会降低。

  HRZ/HRE的叶轮由钢板制成，表面喷塑。

  TRE/TRZ的叶轮由镀锌钢板制成。

- friction, grinding or impact sparks e.g. as a result of contact of the rotating impeller with other parts of the fan. Danger of ignition is reduced when materials are combined in accordance with VDMA 24169 part 1.

  HRZ/HRE is fitted with impellers out of powder coated steel.

  The impellers of TRE/TRZ are manufactured out of galvanized sheet.

- 火花来自于静电载荷不导电部分，例如：塑料部件以及有厚涂层和油漆部分。
- Sparks from electrostatically loaded parts, which are not conductible, e.g. plastic parts and thick coated or painted parts.

风机系列TRZ/TRE Ex和HRZ/HRE Ex是用于区域2设备等级3的并且按照94/9/EC温度等级为T1-T3的。

如果风机是在有潜在爆炸威胁或传输爆炸性气体时，下列几点必须注意：

- 防爆型最高允许转速为其标准最大转速的83%
- 最大轴功率为15kW
- 风机只可用水平轴
- 皮带传动必须按照轴承理论寿命L_{h10} = 20,000 h计算。这个计算（张力）必须用于固定和运行。

皮带轮的直径也必须注意：

- 必须使用认证的皮带
- 必须使用用于区域2的并有相关证书的电机
- 在气流方向上的过滤器如果有潜在的产生火花的颗粒，那么必须使用TRE/TRZ风机
- 风机必须有可以防止颗粒进入或从导风圈吸入的保护装置。

Fans of series TRZ/TRE Ex and HRZ/HRE Ex are assigned to equipment group 3 for usage in zone 2 with temperature class T1-T3 according to 94/9/EC.

The following steps have to be noticed if fans are operated in potential explosive atmosphere or transporting such an atmosphere:

- The maximum allowed ex-speed is 83% of that of the standard speed
- The maximum power is 15kW
- The fans must be used only with horizontal shaft
- The belt drive has to be calculated to a theoretical bearing lifetime of L_{h10} = 20.000 h. This calculation (tension instruction) has to be used on mounting and operating

The V-pulley diameters have to be observed:

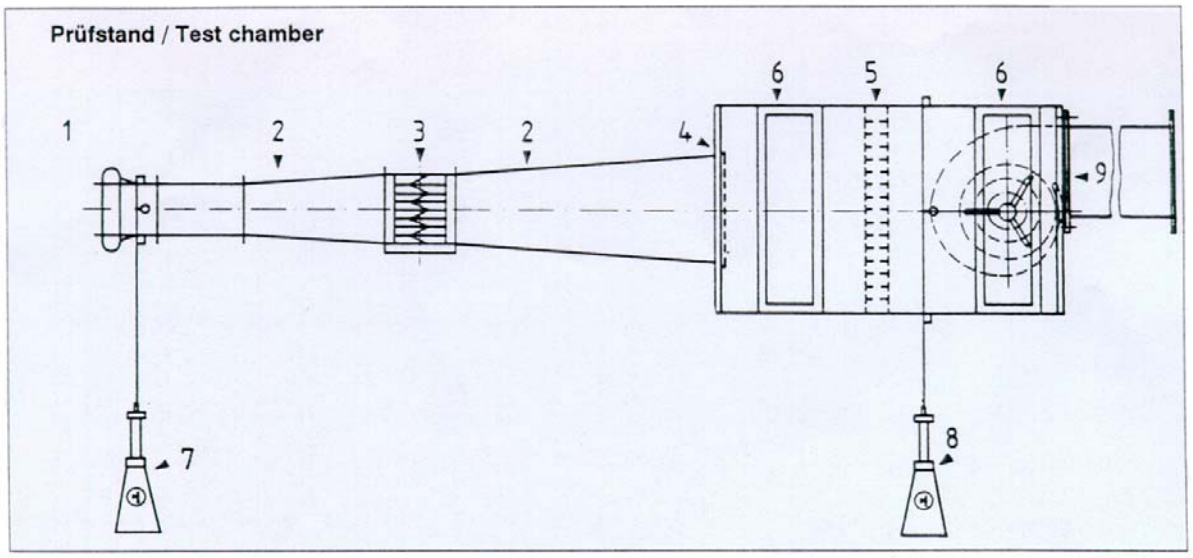
- Use only certified conductive belts
- Use only motors licensed at least for zone 2
- If potentially sparking particles can be in the airflow filters must be used especially by TRE/TRZ
- The fans have to be protected against particles which can falling in or can be absorbed from the inlet

空气特性曲线

空气特性曲线是根据DIN 24163规定，利用如下图所示测试装置并用进风测试法建立的。它们在空气密度为1.2 kg/m^{3}时有效。特性曲线在安装位置B（自由进风，增加压力侧）获得，其显示进风口压力Δp_{fa}随风量变化的函数关系。

Air performance curves

The air performance curves have been established using the inlet test method in the test chamber as shown below according to DIN 24163. They are valid for air with a density of 1.2 kg/m^3. The performance curves were made in mounting position B (free inlet, pressure side added) and show the total pressure increase, available on inlet side, Δp_{fa} as a function of the volume flow.



1 导流口
2 过渡段
3 带导流板的节流装置
4 屏栅
5 导流板
6 带风门测试室
7 导流口压力计（动压）
8 压力计p_{fa}
9 待测风机

1 Inlet cone
2 Transition parts
3 Throttling device with straightener
4 Screens
5 Straightener
6 Measuring chamber with shutters d)
7 Inlet cone pressure manometer (p
8 Pressure manometer p
9 Tested fan

密度的影响

所有测试数据是建立在空气密度为1.2 kg/m^3。对于任何其他的条件，您必须根据如下公式来修正压力和轴功率：

Influence of density

The measured data base on air with a density of ρ=1.2 kg/m^3. For any other conditions you have to correct the pressure increase and power consumption as follows:

$$p_2 = p_1 \times \frac{\rho_2}{1{,}2} \qquad P_2 = P_1 \times \frac{\rho_2}{1{,}2}$$

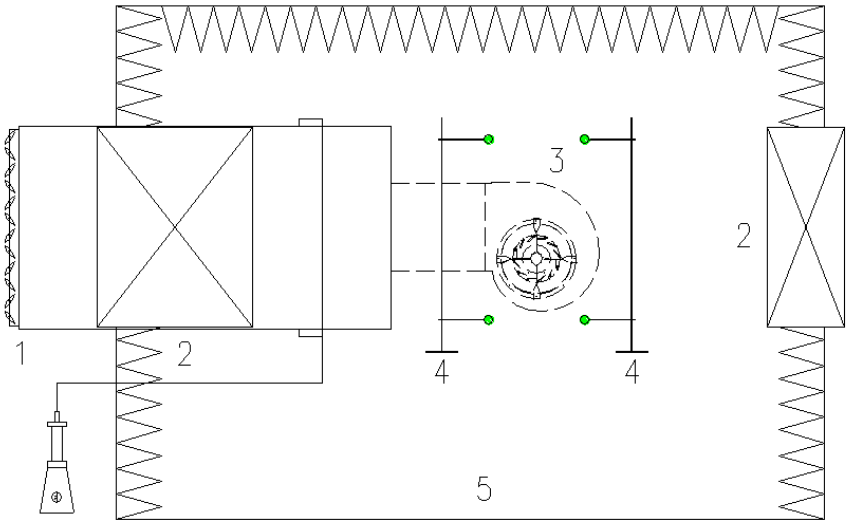
p_1 / P_1 = 压力 / 轴功率（查图表所得）
pressure increase / power consumption out of diagram
p_2 / P_2 = 压力 / 轴功率（新密度下的）
pressure / power consumption with new density
ρ_2 = 更改后的密度 / changed density

噪音数据

风机的测试和噪音曲线是根据DIN 45635中第38部分的规定，利用包围面方法测试得到的。根据这个测试系统的要求，采集点分布在平面的测试区域内，如下图所示：

Noise level data

The tests and their performance curves were made according to DIN 45635, part 38, according to the enveloping surface method. According to this measuring system, several measuring points are collected via a quadratic test area. You can see the measurement system in the following picture.



1 流量控制阀 /shutter door
2 消音器 /sound attenuator
3 待测风机 / test sample
4 测点分布 / measurement arrangement
5 单面反射的无反射室/ Room with less reflection with one plane of reflection

特性图表显示了自由出风处的A声功率级L_{WA6}，同时也在DIN 45635中第38部分里显示。

The characteristic diagram shows the A-weighted free outlet sound power level L_{WA6}, as it is shown in DIN 45635 part 38.

自由进风处的A声功率级L_{WA7}可以用如下方法计算得到：

The free inlet sound power level L_{WA7} can be obtained according to following calculation:

HRE / HRZ	$L_{WA7} = L_{WA6}$ - 3 dB
TRE / TRZ	$L_{WA7} = L_{WA6}$

对于使用何种噪音防护，八阶声功率级是非常重要的，可以通过减去系数L_{Wrel}得到。

For the determination of sound protective arrangements the sound power levels of the octave bands are important. By subtracting the factor L_{Wrel}:

$$L_{Wokt} = L_{WA} - L_{Wrel}$$

系数L_{Wrel}是由V_{opt}.决定的

The factor L_{Wrel} is determined on V_{opt}.

型号/ **type**	尺寸 / **size**			**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**
HRZ	**160 - 355**	进风口 **inlet side**		-6	-4	-4	-3	-8	-11	-13	-19
HRZ	**400 - 1000**	进风口 **inlet side**		-4	-5	-3	-7	-9	-9	-12	-17
HRZ	**160 - 355**	出风口 **outlet side**		-5	-3	-3	-2	-6	-7	-12	-20
HRZ	**400 - 1000**	出风口 **outlet side**		-4	-3	-2	-4	-4	-8	-14	-20
TRZ	**160 - 355**	进风口 **inlet side**		-3	-2	-4	-7	-6	-6	-8	-14
TRZ	**400 - 1000**	进风口 **inlet side**		0	-3	-5	-4	-6	-7	-9	-15
TRZ	**160 - 355**	出风口 **outlet side**		-3	-4	-2	-5	-5	-7	-10	-15
TRZ	**400 - 1000**	出风口 **outlet side**		3	-3	-3	-3	-7	-7	-10	-16

对于单进风风机（TRE / HRE），上表中的数据会有± 2dB的误差。

For fans with single inlet (TRE / HRE) the data as shown in the table above can be used with a precision of ± 2dB.

在图表中所示的声功率特性曲线是通过所测得的在特定速度下的值并通过如下公式计算出其他速度下的值所得到的结果:

The characteristic sound power curve as indicated in the diagrams are measured at a characteristic speed and are calculated to other speeds as follows:

$$L_{WAn2} = L_{WAn1} + k * \log n_2/n_1$$

无论如何这个系数是通过不同尺寸的风机测试得来的。

Where by the factor is determined in test measurements on various fan sizes.

由于环境影响会导致声压级的值有很大的偏差，作为一个参考值，您可以用1m距离处的声功率值减去7dB做为它的声压值。

The expected sound pressure level can only be approximately determined as the ambient influences can lead to strong deviations. As a reference value you can subtract 7 dB from the sound power level for a distance of 1m to reach the sound pressure level.

风量测试装置

后倾叶轮风机的风量测试装置由一个装在吸风侧的闭式循环管组成，四个测量装置合并在进风导风圈上以测量风压

由于这个测量装置可以通过进风导风圈处的静压和吸风处的静压之间压差来控制风量。

需要注意的是在所测吸风处是没有动压的。测量时所钻的孔必须保持在同一平面上。

在风机运行时，直接控制和测定风机的流量是可行的。

风量通过如下公式计算得到：

Air volume testing device

The air volume testing device for fans with backward curved impellers consists of a closed circular pipe on suction side with four measuring devices incorporated in the inlet cone to measure the pressure.

Due to this measuring device it is possible to control the air volume depending on the difference in pressure between the static pressure at the inlet cone and the static pressure on the suction side.

Please note that no dynamic pressure in the suction space is measured. The drillings for measurement have to be aligned accordingly.

As a result a direct control and determination of the volume flow of the fans is possible during operation

The air volume is calculated according to the following formula:

$$\dot{V} = k \cdot \sqrt{\frac{2}{\rho} \cdot \Delta p}$$

$\dot{V}$	风量 / air volume	m^3/h
k	校准系数 / calibration factor	
ρ	气体密度 / density of gas	kg/m^3
Δp	压差 / differential pressure	Pa

测试每款不同风机时所用不同的校准系数如下：

k_{10} =风量偏差小于10%

Testing of each type of fan has shown that the calibration factor k for each type of fan is:

k_{10} = deviation of the airflow smaller than 10%

	225	250	280	315	355	400	450
HRZ	90	110	135	172	218	275	345

	500	560	630	710
HRZ	430	550	690	870

在测量单进风风机时（HRE, TRE），上述系数除以2.

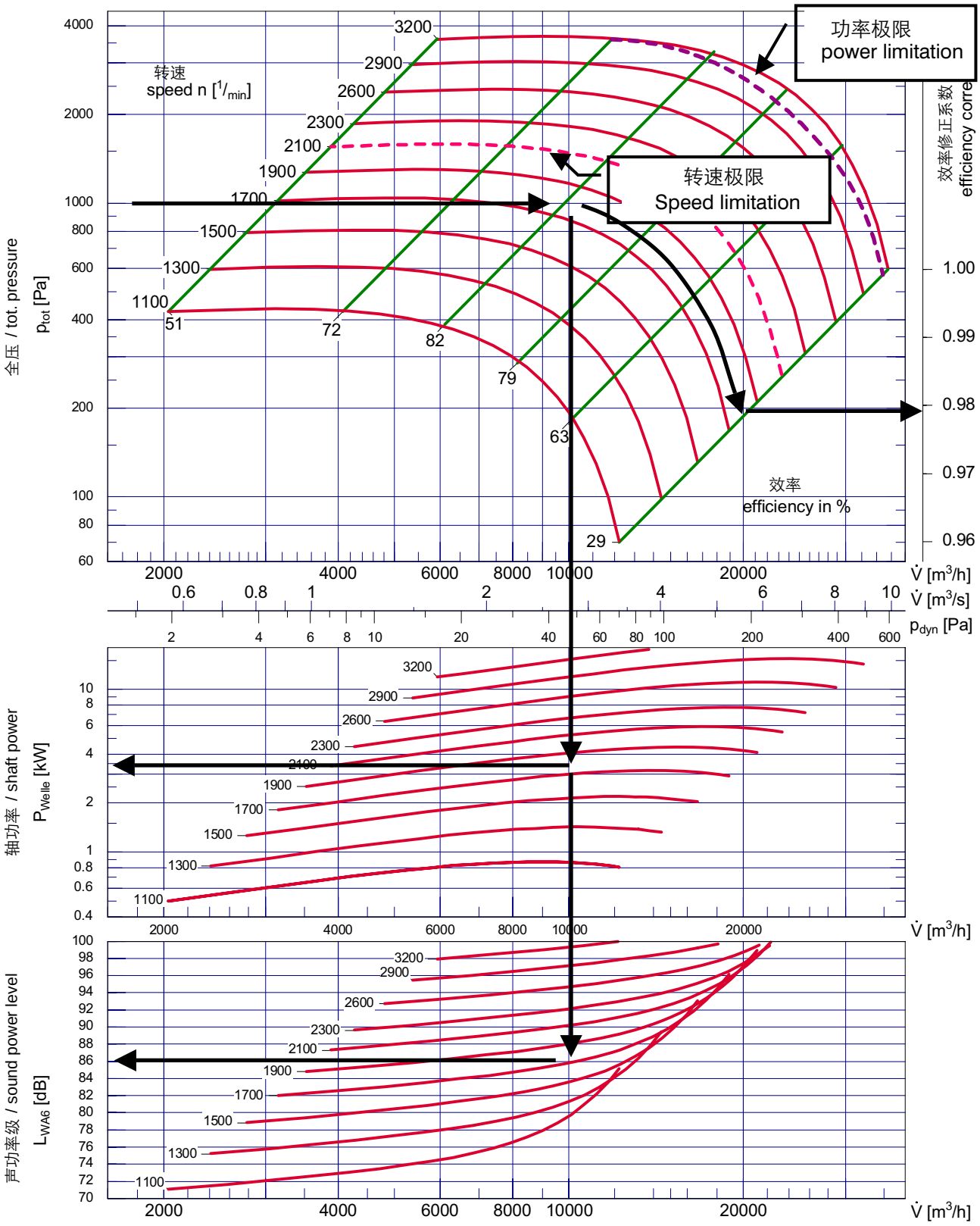
To obtain the air volume flow of the single inlet fans (HRE, TRE) you have to bisect the data above.

使用的符号 Used Symbol

V	流量 / volume flow	m3/h
Δp_t	全压 / total pressure	Pa
Δp_{st}	静压 / static pressure	Pa
Δp_d	动压 / dynamic pressure	Pa
n	转速 / speed	1/min
P_w	轴功率 / shaft output	kW
P_m	电机功率 / motor power	kW
n_t	效率 / efficiency	%/100
ρ	密度 / density	kg/m^3
D_2	叶轮直径 / diameter of the impeller	mm
A	截面积 / cross-sectional area	m^2
J	质量惯性矩 / mass moment of inertia	kgm^2
t_a	启动时间 / starting time	s
L_{pA}	A声压级 / A-weighted sound pressure level	dB
L_{WA}	A声功率级 / A-weighted sound power level	dB
L_{WOkt}	八音阶声功率级 / octave sound power level	dB
L_{Wrel}	相对声功率 / relative sound power	dB
F	频率 / frequency	Hz

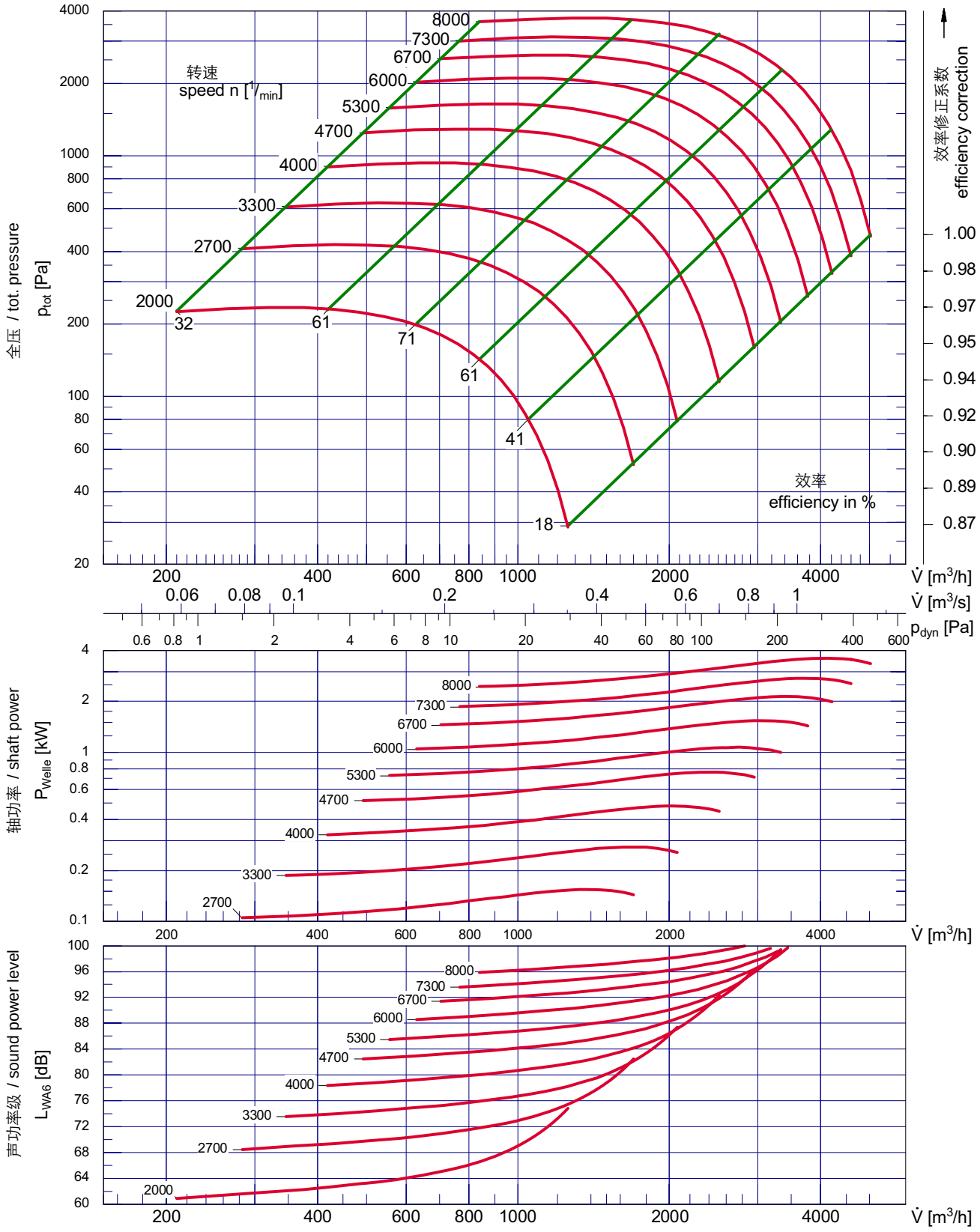
所需运行工况
10.000 m3/h, 1000 Pa
选择：HRZ450

Requested operating point
10.000 m3/h, 1000 Pa
Selected: HRZ 450

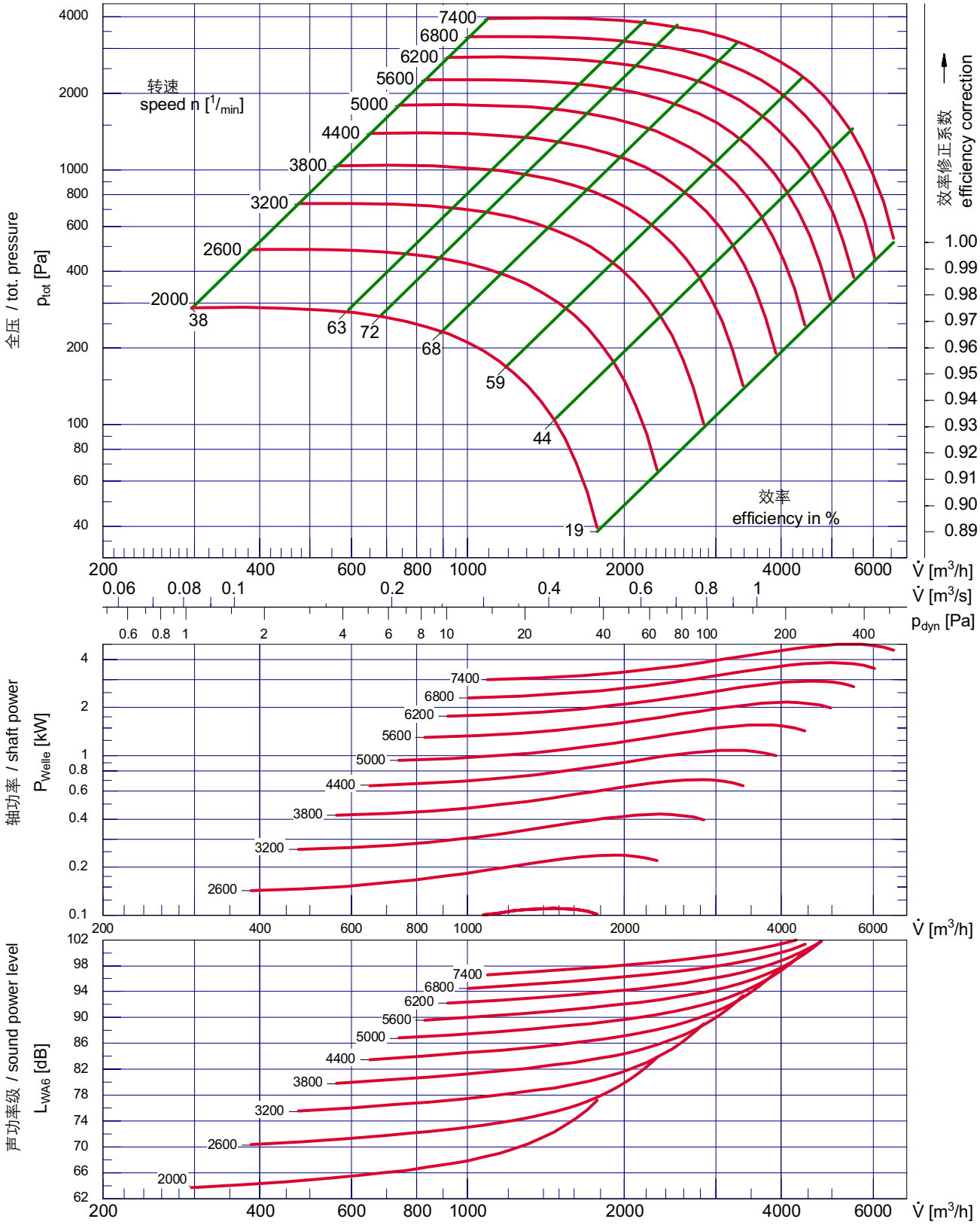


效率 82% x 0.98 = 80.4%,
动压 47 Pa, 轴功率3.6 kW,
声功率级 L_{WA6} 87 db(A)

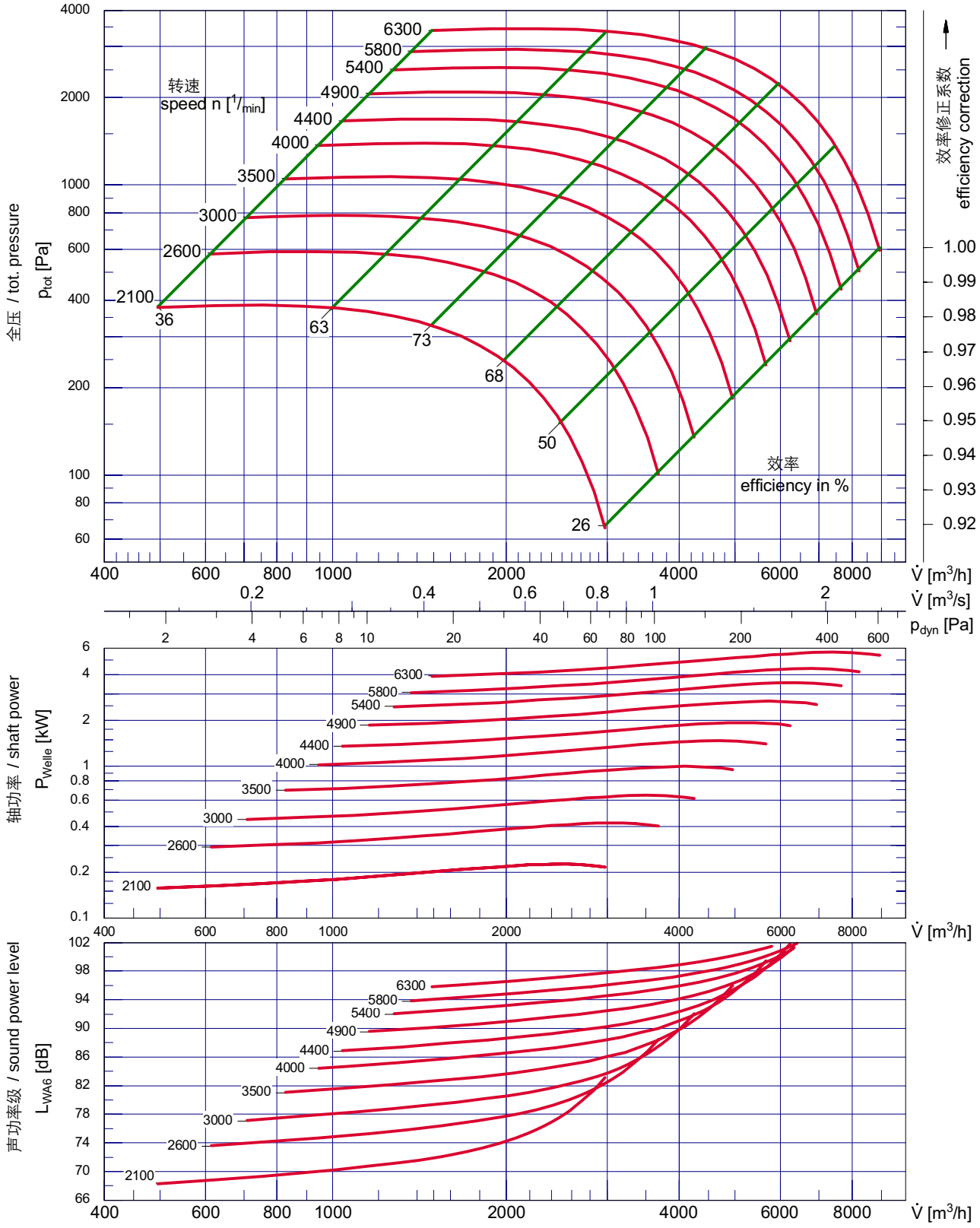
Efficiency 82% x 0,98 = 80,4%,
dyn. pressure 47 Pa, shaft power 3,6kW,
sound power level L_{WA6} 87 db(A)



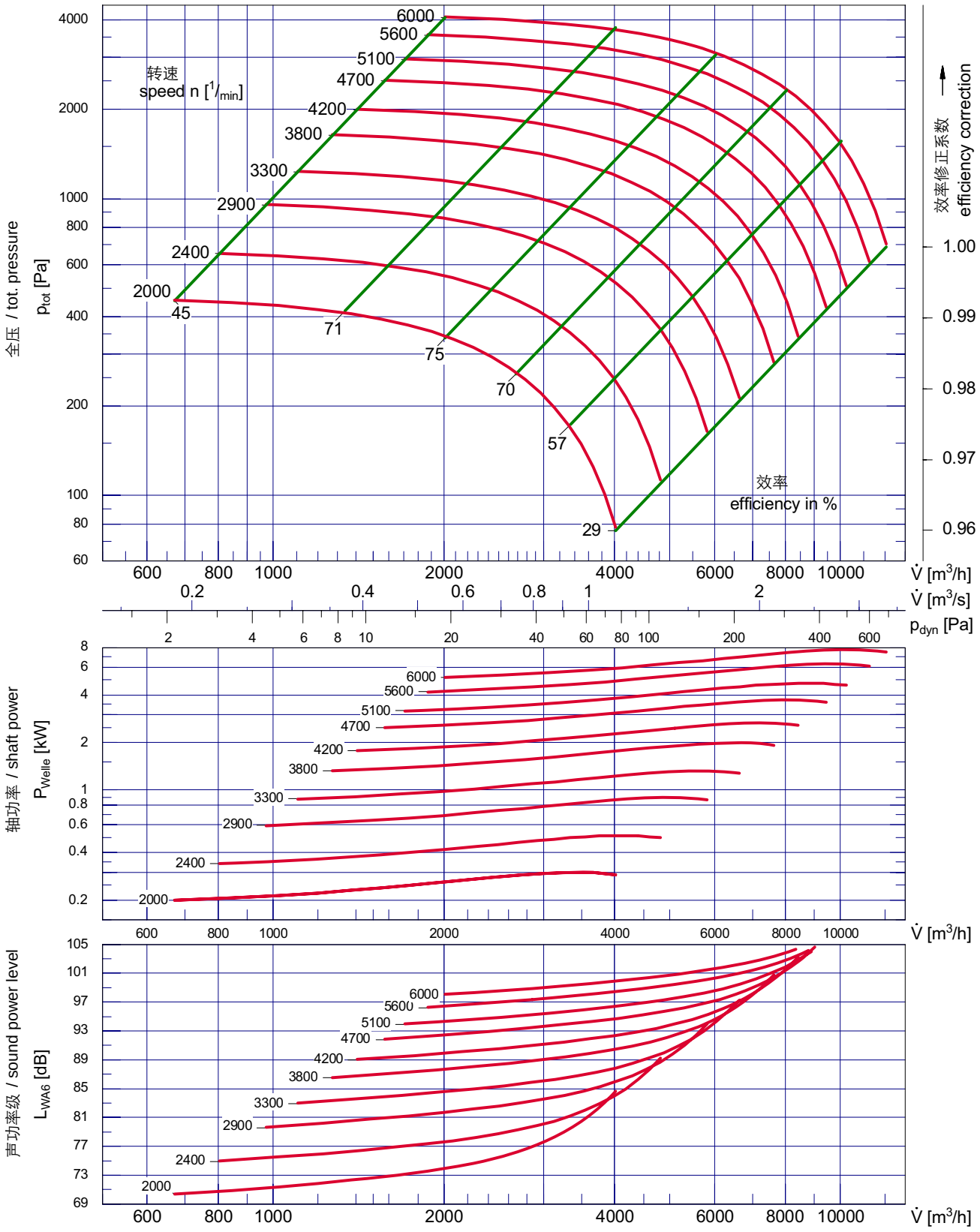
最高转速 / max. speed	8000 $^1/_{min}$
消防型最高转速 / max. speed ex	6100 $^1/_{min}$



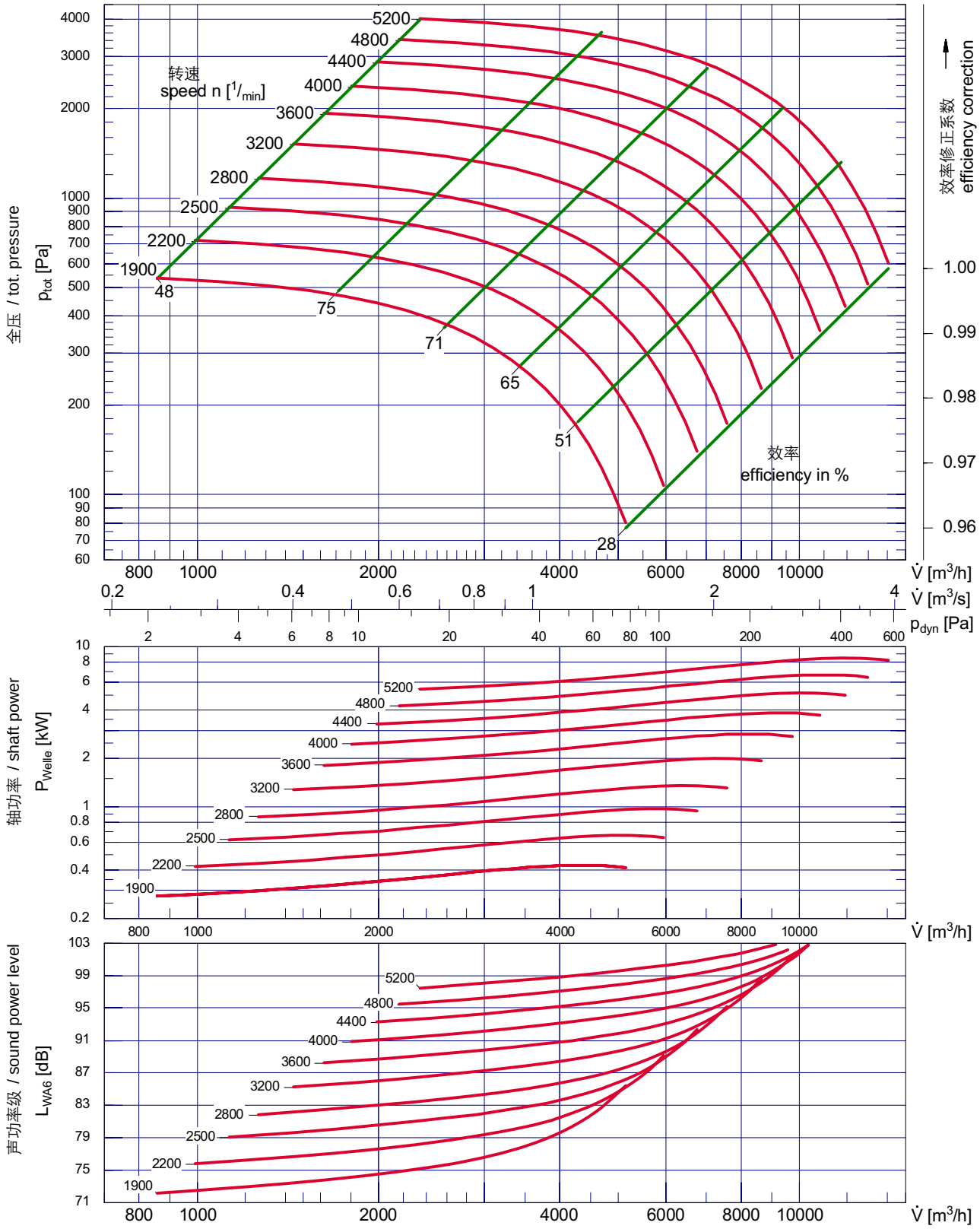
最高转速 / max. speed	7400 $^1/_{min}$
消防型最高转速 / max. speed ex	5650 $^1/_{min}$



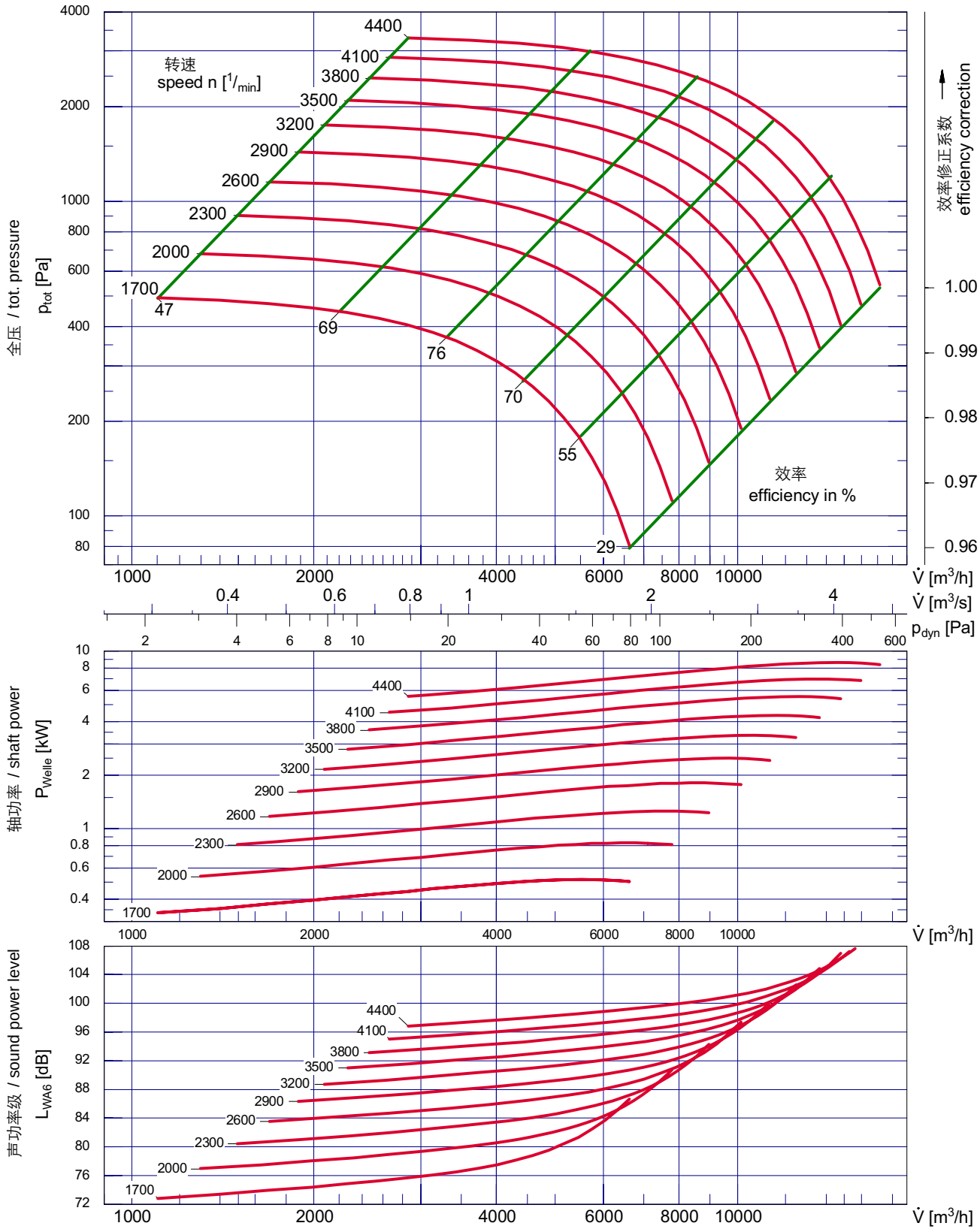
最高转速 / max. speed	6300 $^{1}/_{min}$
消防型最高转速 / max. speed ex	4800 $^{1}/_{min}$



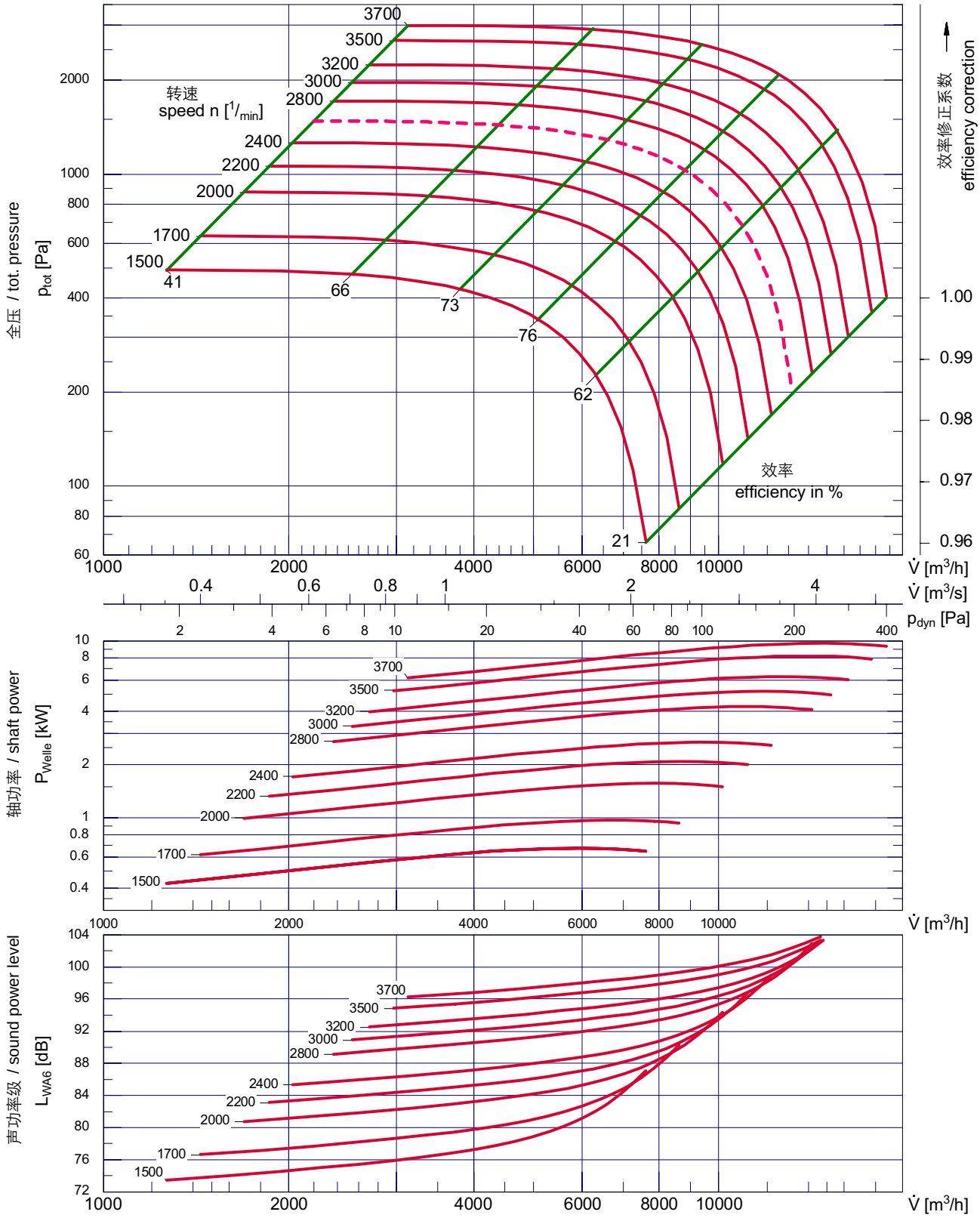
最高转速 / max. speed	6000 $^1/_{min}$
消防型最高转速 / max. speed ex	4550 $^1/_{min}$



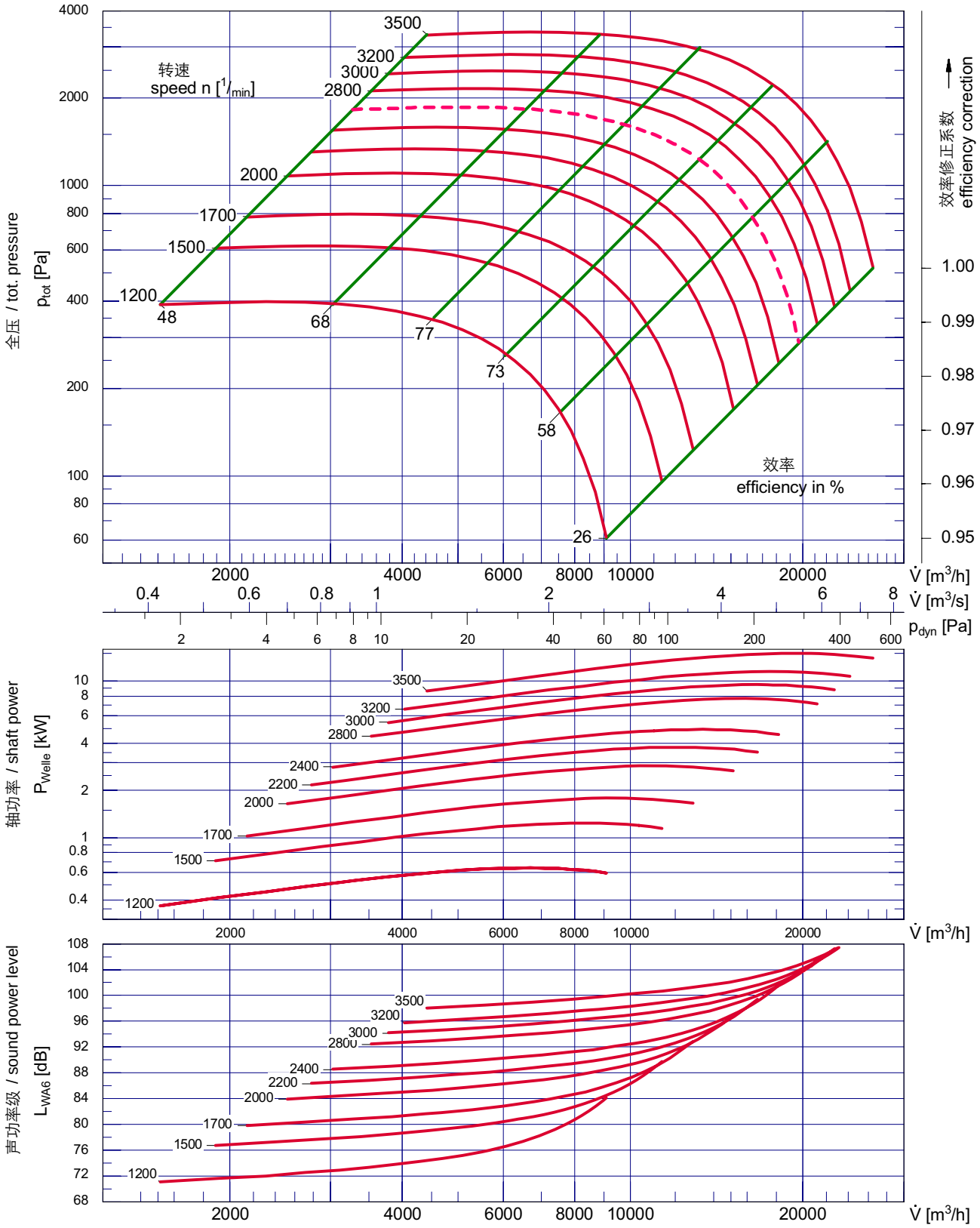
最高转速 / max. speed	5200 $^1/_{min}$
消防型最高转速 / max. speed ex	3950 $^1/_{min}$



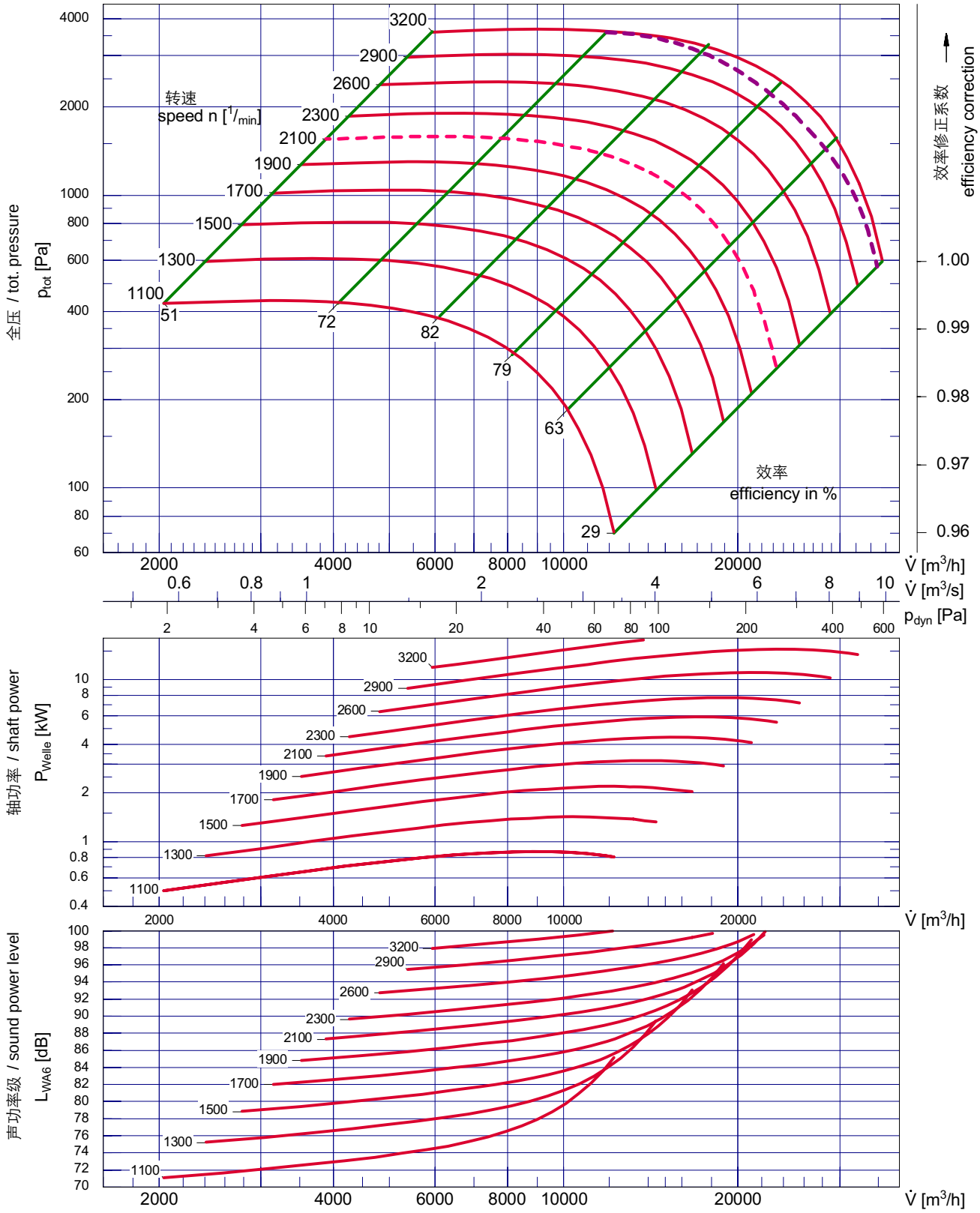
最高转速 / max. speed	4400 $^1/_{min}$
消防型最高转速 / max. speed ex	3300 $^1/_{min}$



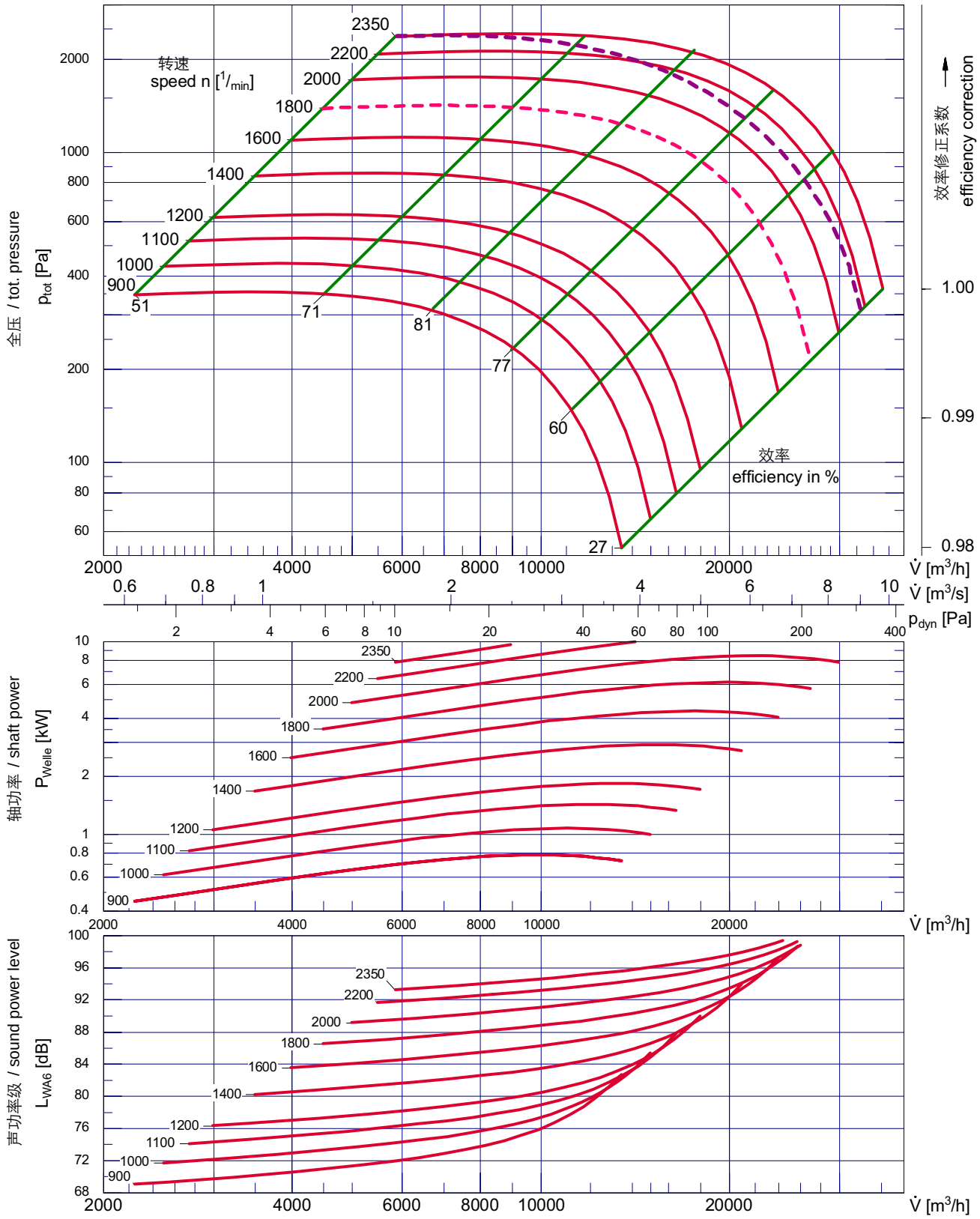
最高转速 / max. speed	3700 $^1/_{min}$
消防型最高转速 / max. speed ex	2810 $^1/_{min}$



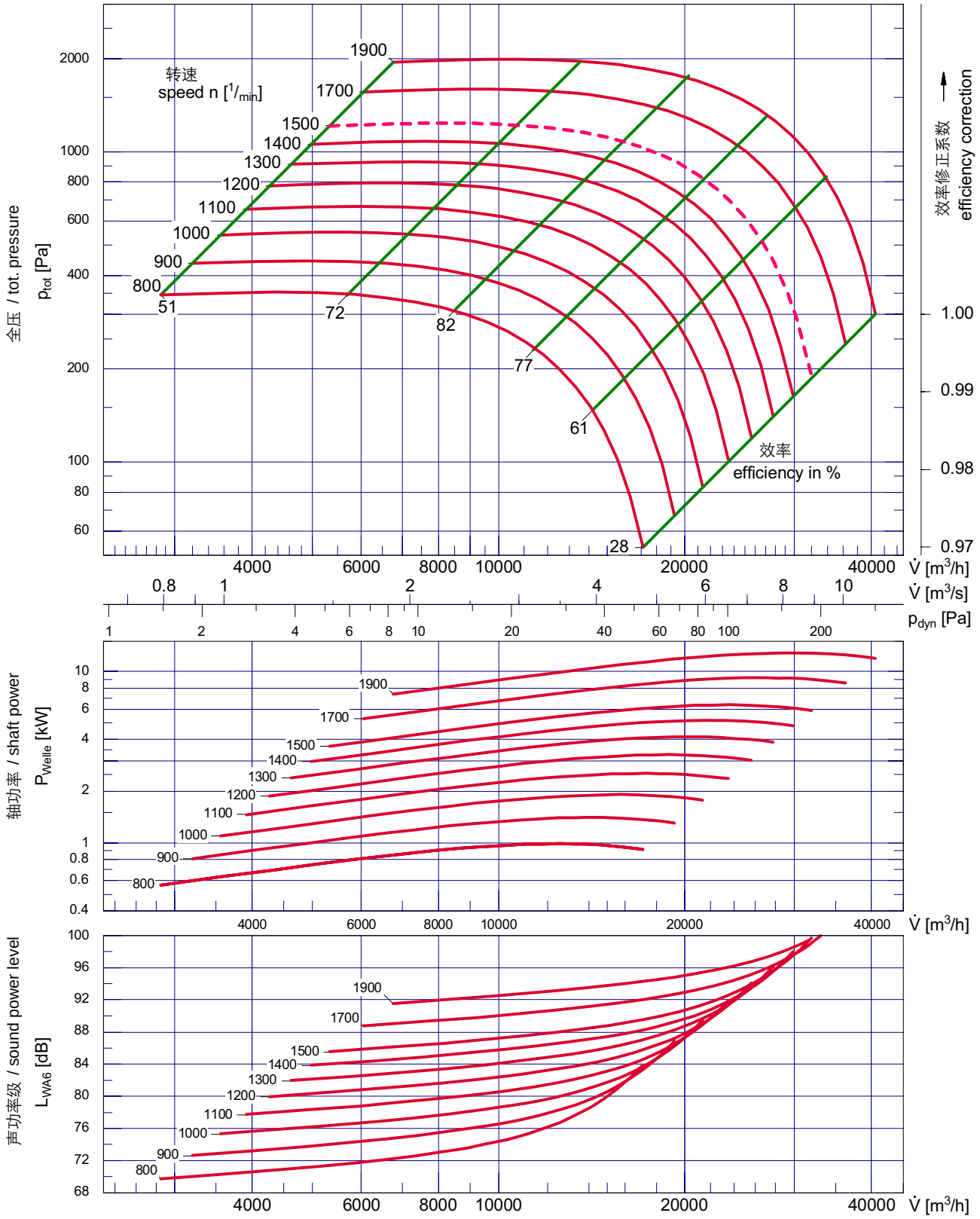
最高转速 / max. speed	3500 $^1/_{min}$
消防型最高转速 / max. speed ex	2650 $^1/_{min}$



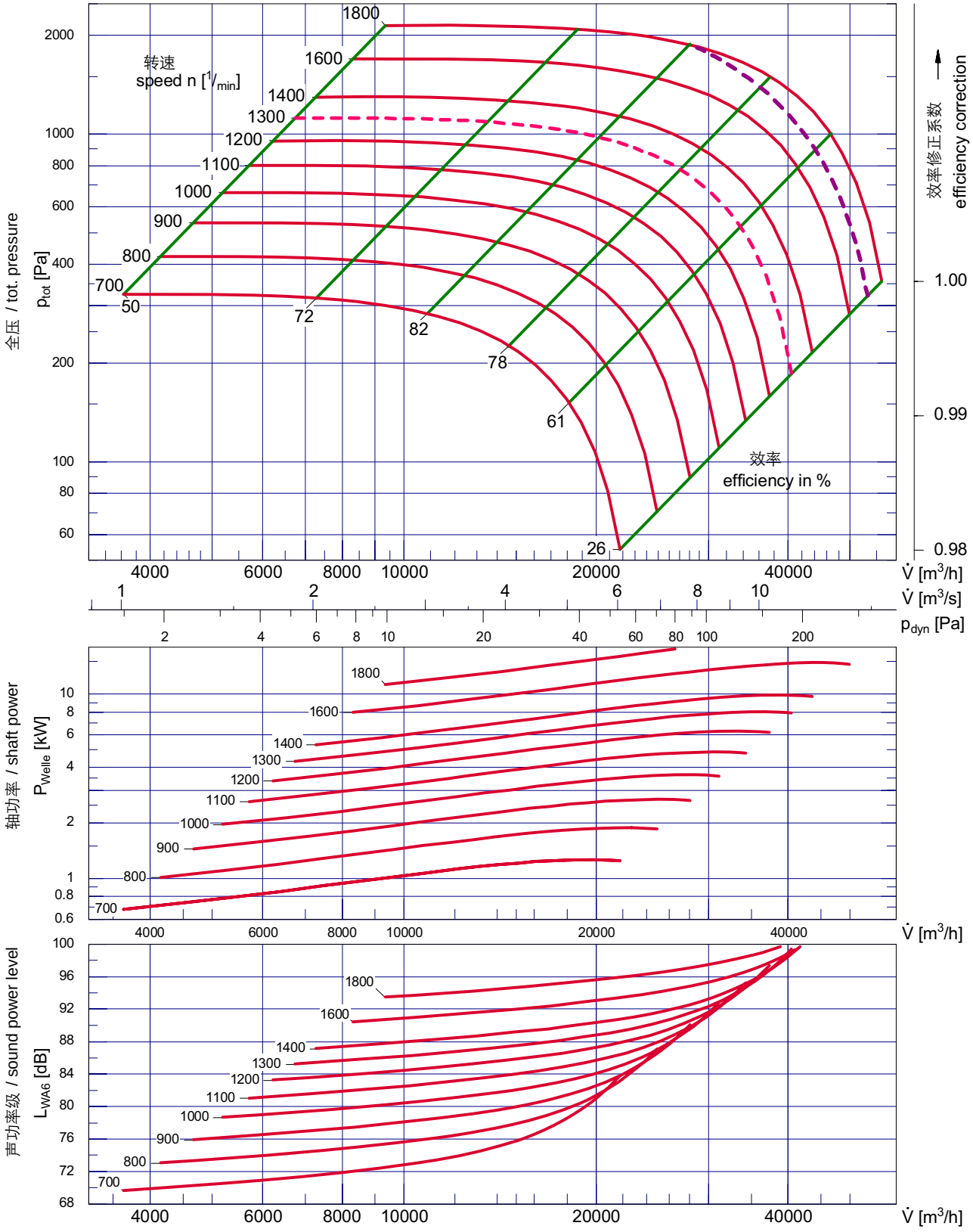
最高转速 / max. speed	3200 $^1/_{min}$
消防型最高转速 / max. speed ex	2450 $^1/_{min}$



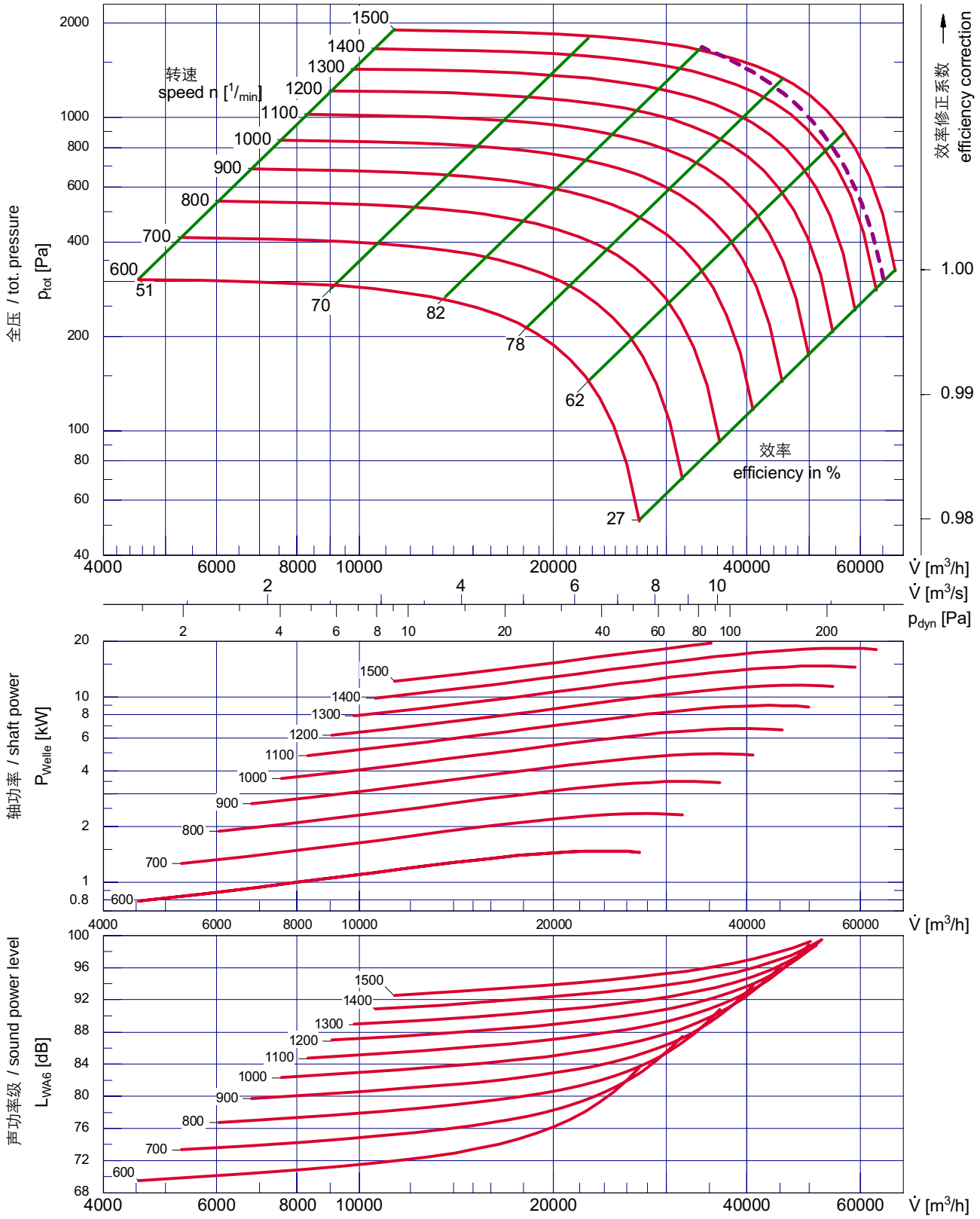
最高转速 / max. speed	2350 $^1/_{min}$
消防型最高转速 / max. speed ex	1750 $^1/_{min}$



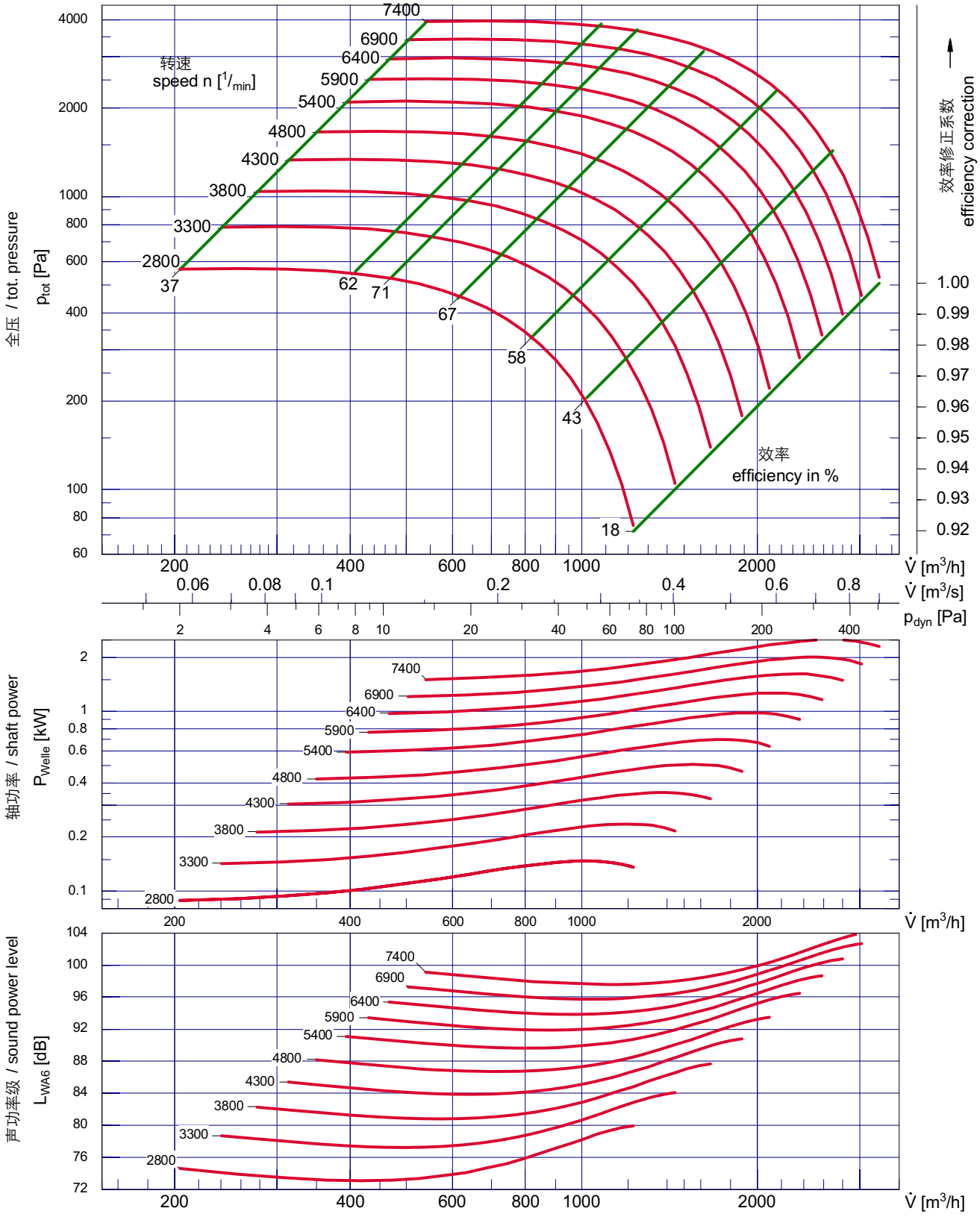
最高转速 / max. speed	1900 $^1/_{min}$
消防型最高转速 / max. speed ex	1450 $^1/_{min}$



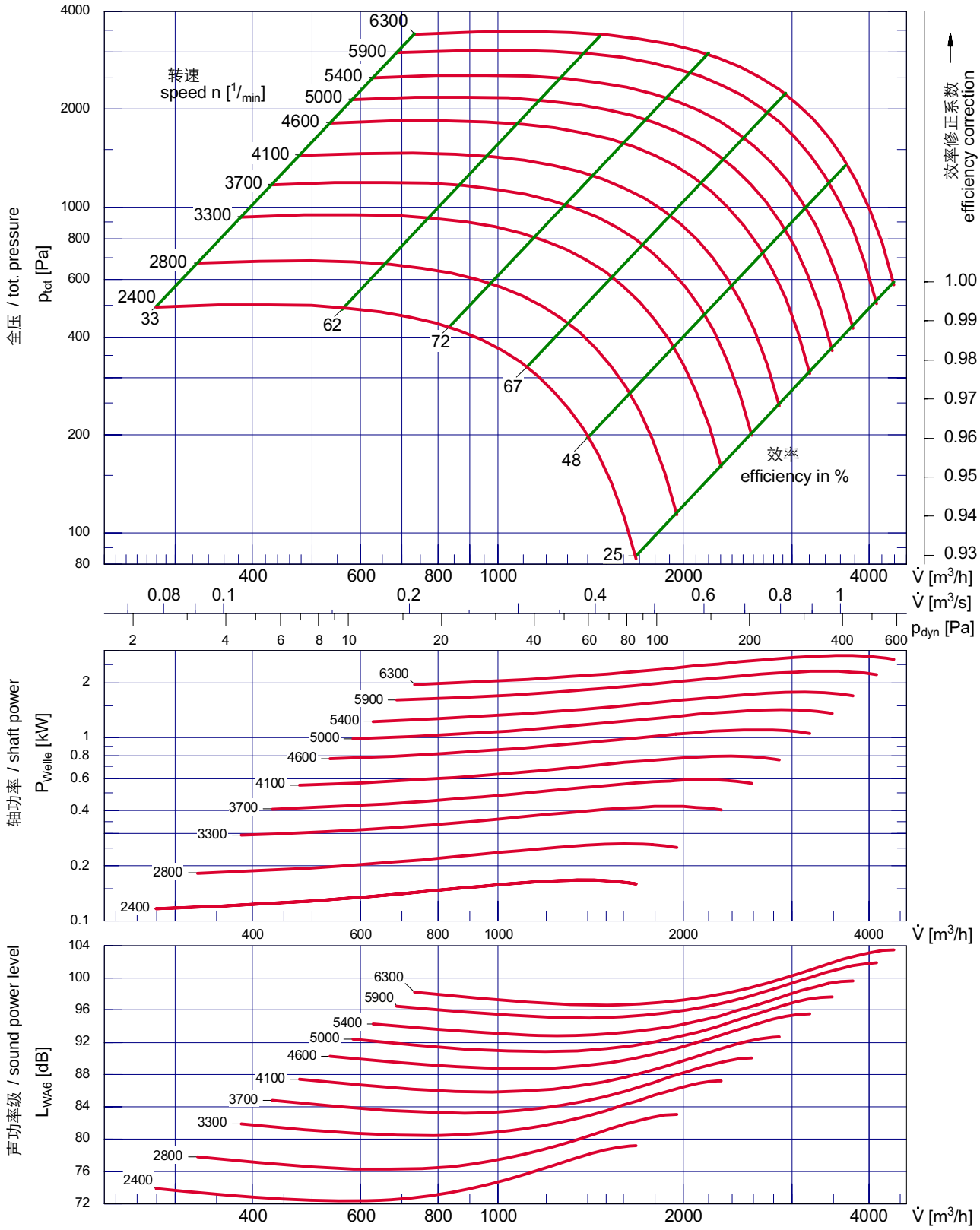
最高转速 / max. speed	1800 $^1/_{min}$
消防型最高转速 / max. speed ex	1350 $^1/_{min}$



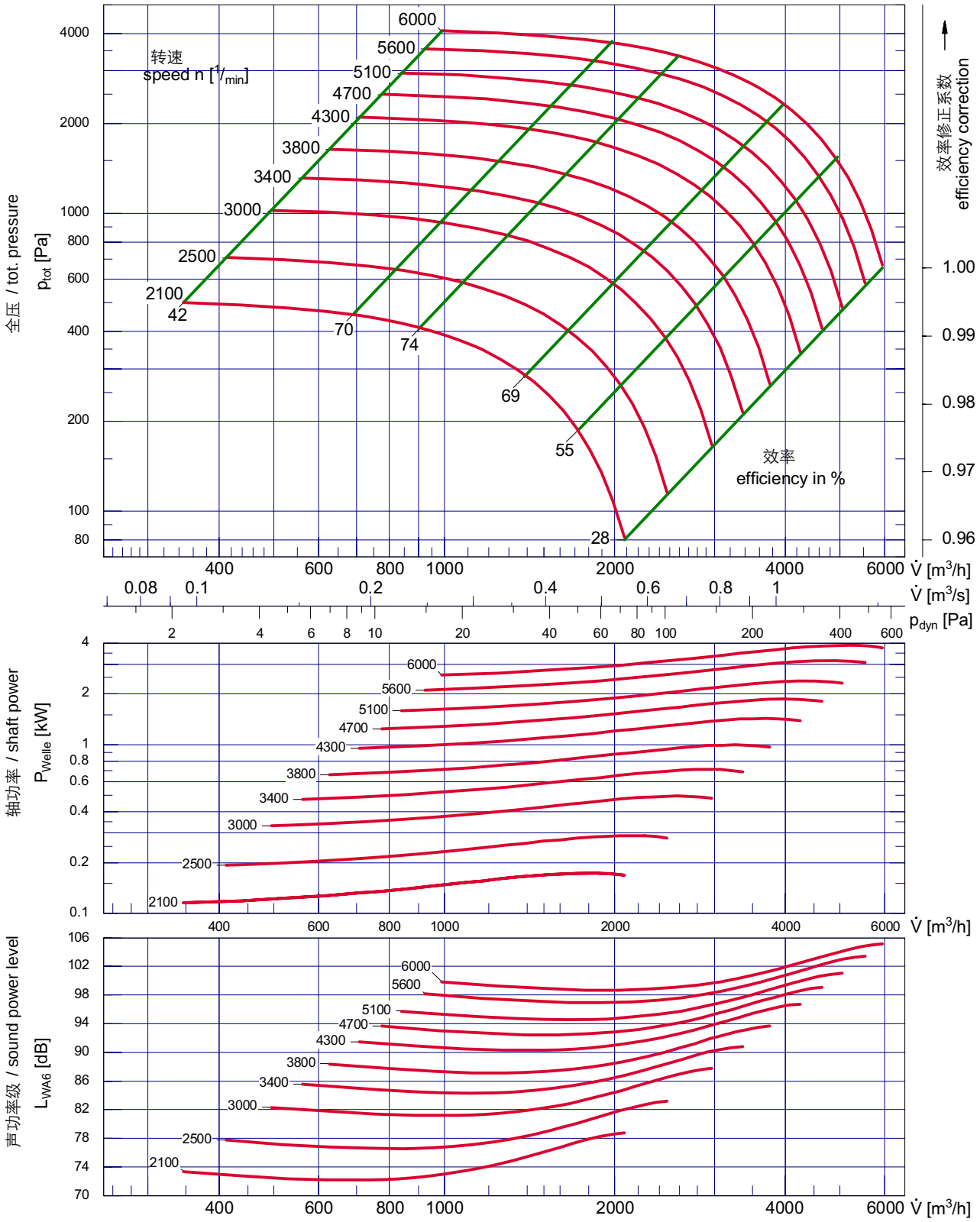
最高转速 / max. speed	1500 $^1/_{min}$
消防型最高转速 / max. speed ex	1100 $^1/_{min}$



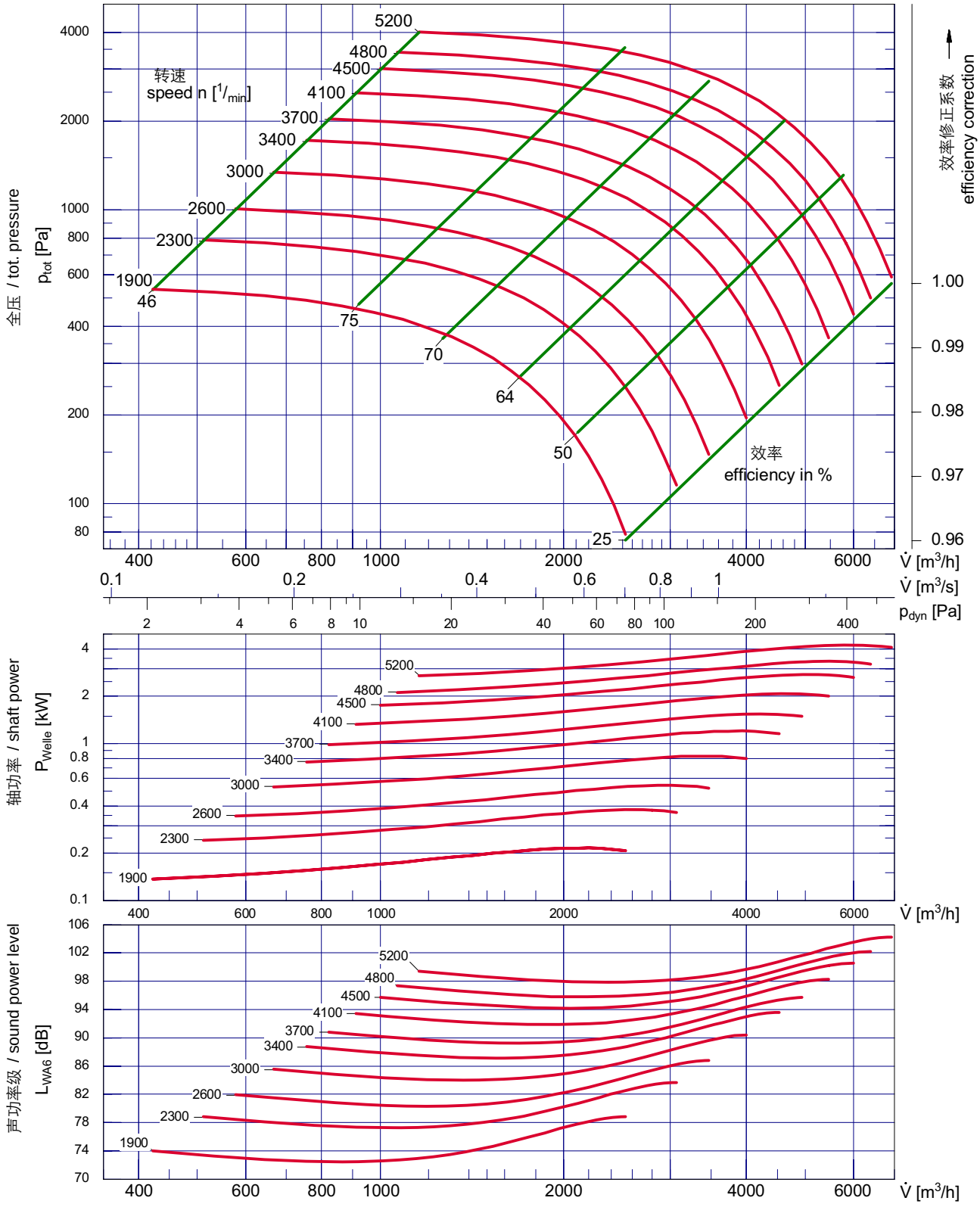
最高转速 / max. speed	7400 $^1/_{min}$
消防型最高转速 / max. speed ex	5650 $^1/_{min}$



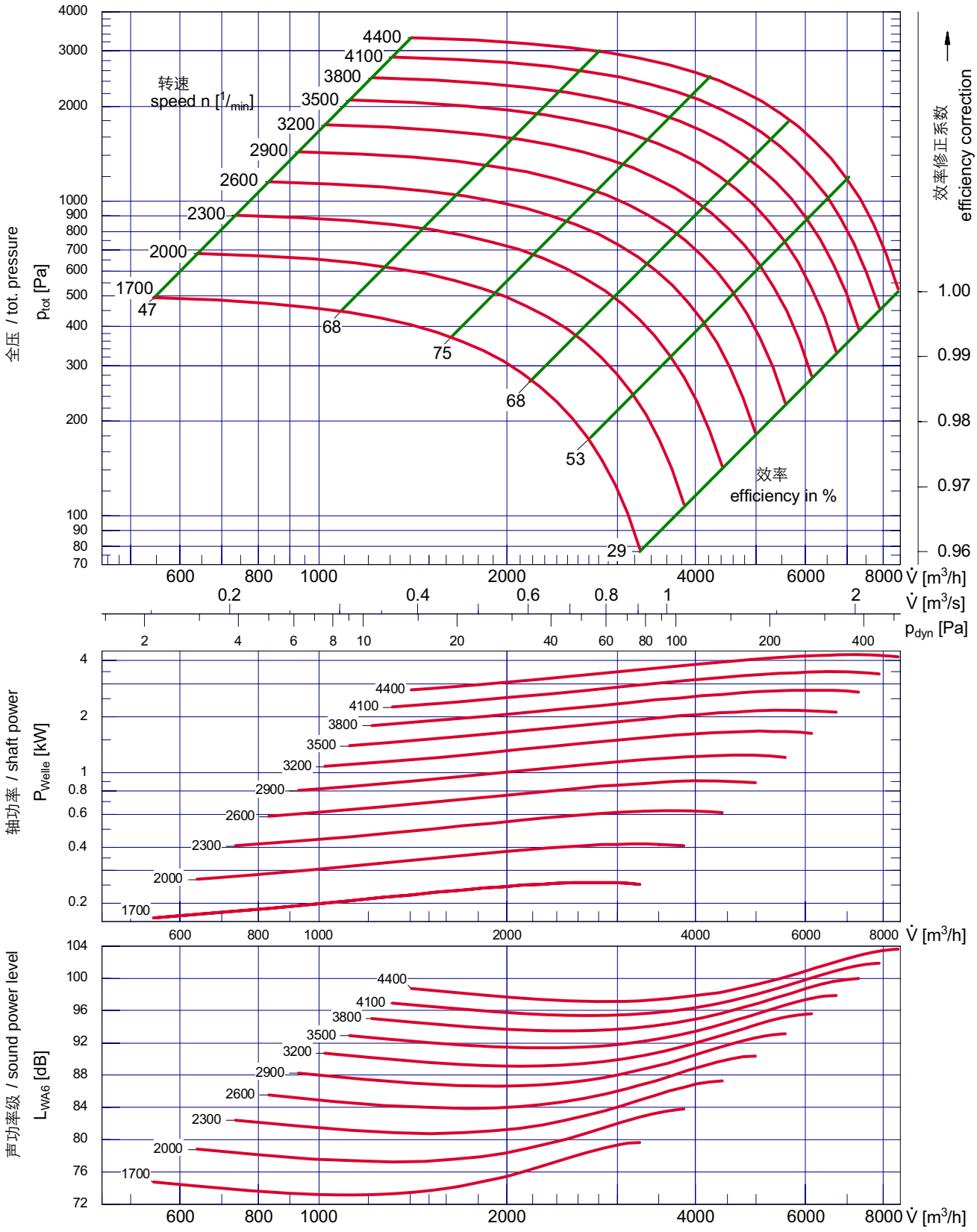
最高转速 / max. speed	6300 $^1/_{min}$
消防型最高转速 / max. speed ex	4800 $^1/_{min}$



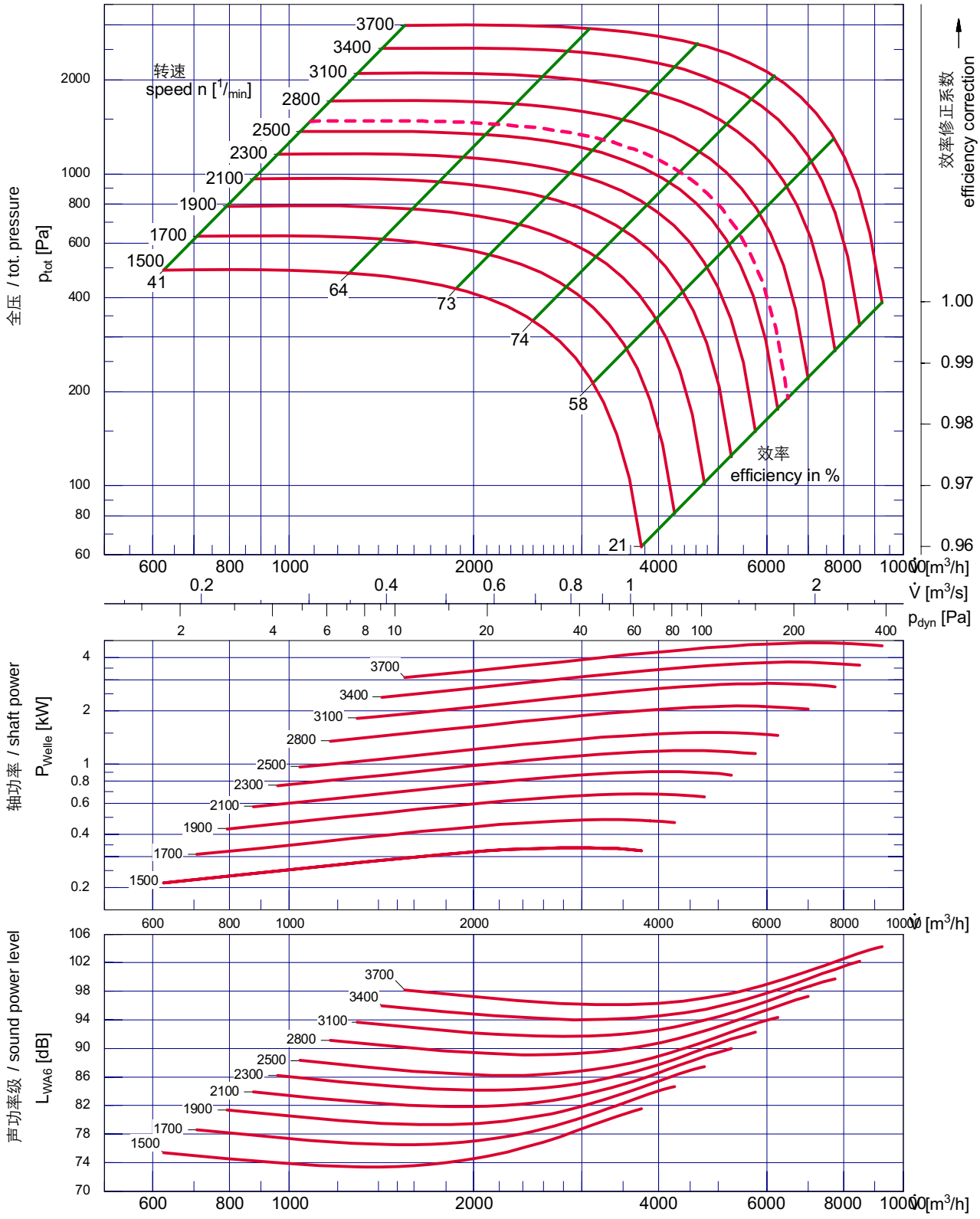
最高转速 / max. speed	6000 $^1/_{min}$
消防型最高转速 / max. speed ex	4550 $^1/_{min}$



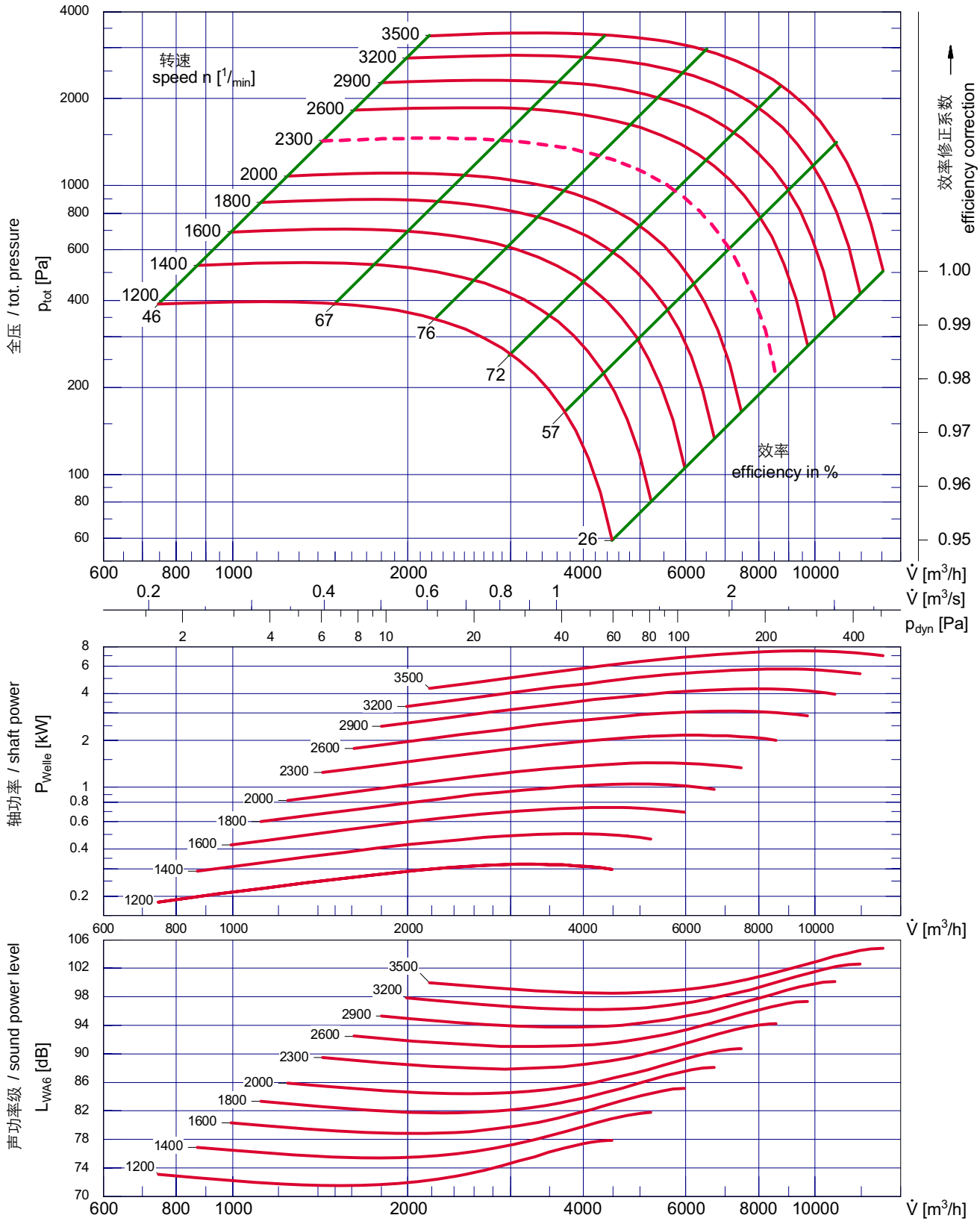
最高转速 / max. speed	5200 $^1/_{min}$
消防型最高转速 / max. speed ex	3950 $^1/_{min}$



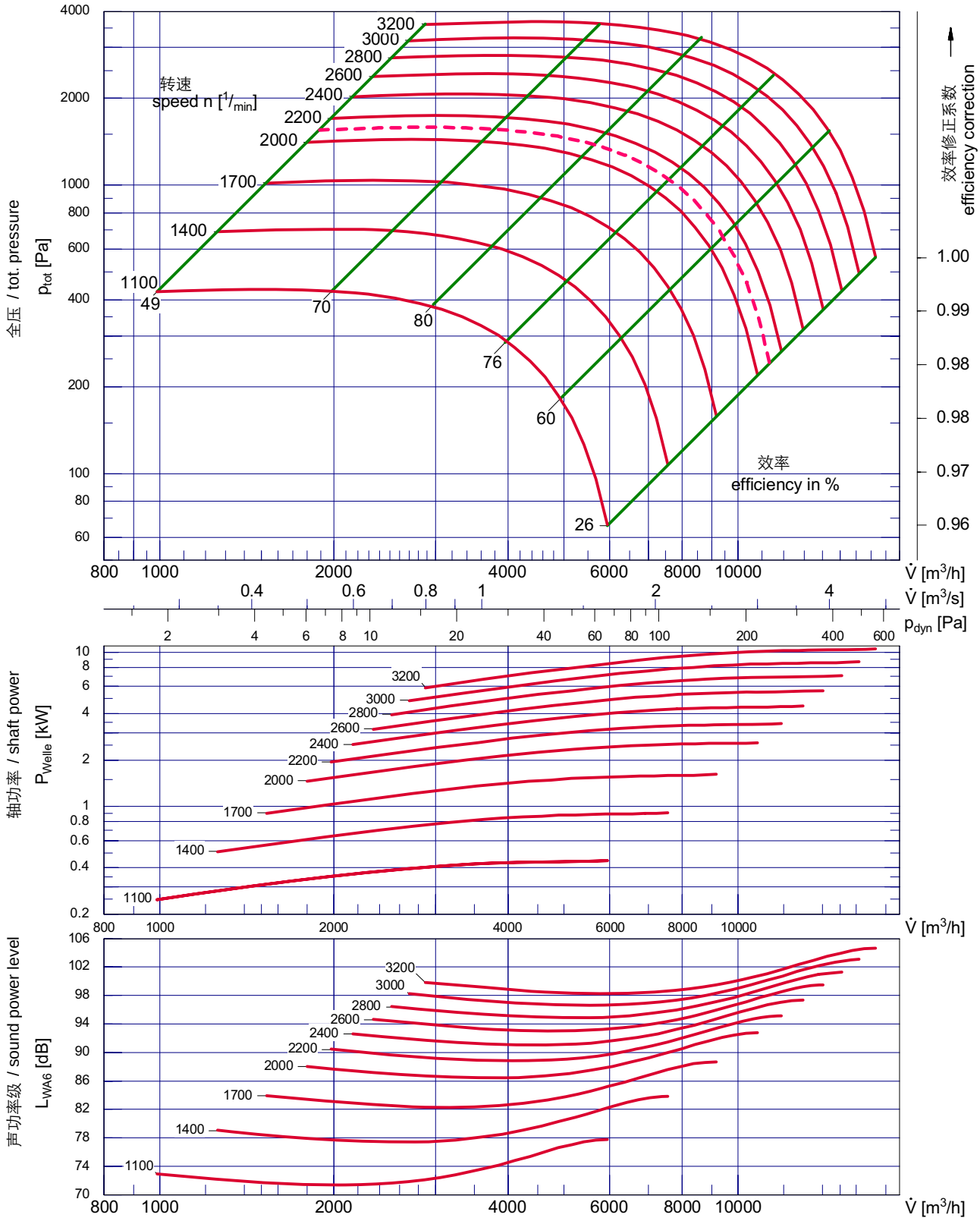
最高转速 / max. speed	4300 $^1/_{min}$
消防型最高转速 / max. speed ex	3300 $^1/_{min}$



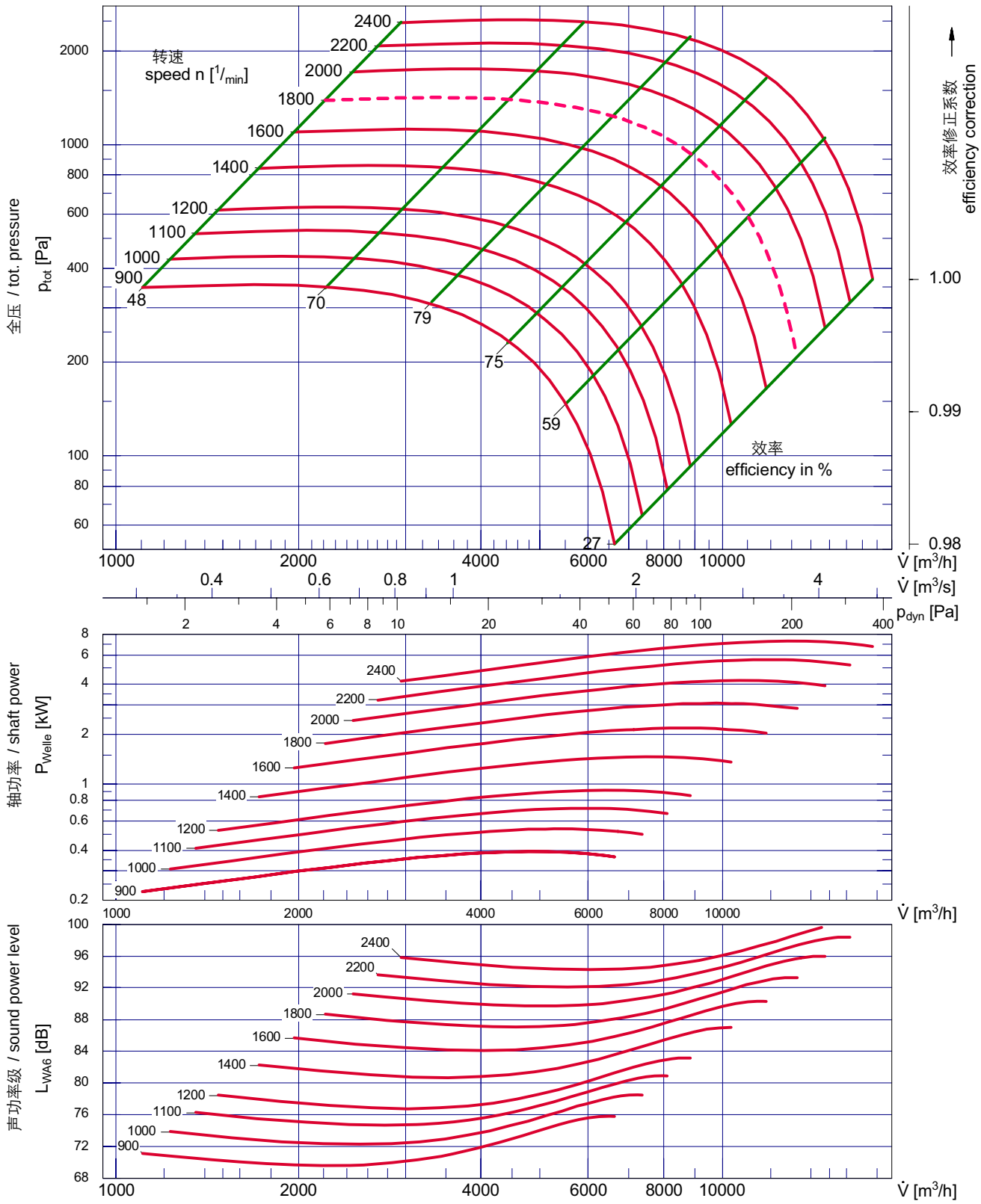
最高转速 / max. speed	3700 $^1/_{min}$
消防型最高转速 / max. speed ex	2800 $^1/_{min}$



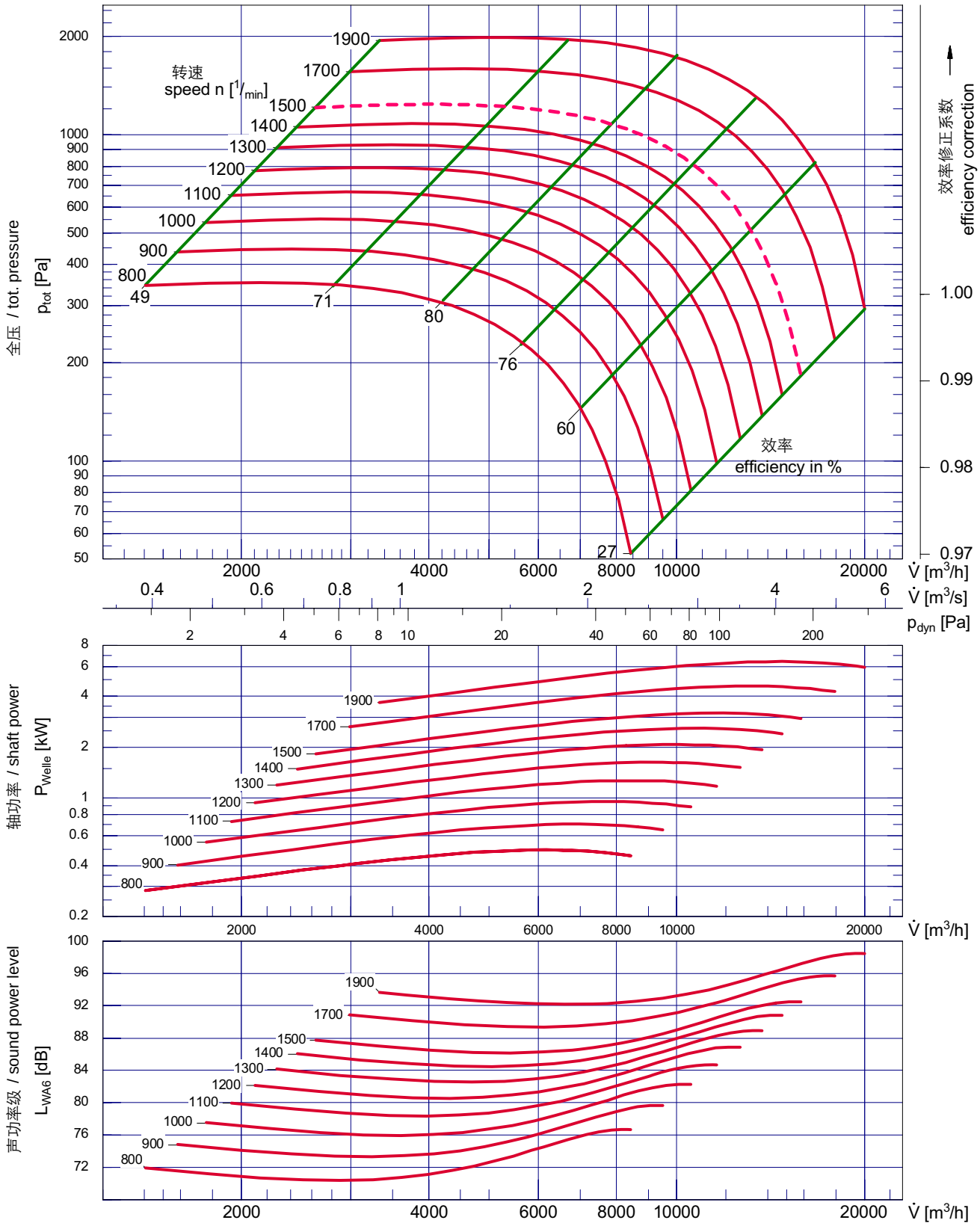
最高转速 / max. speed	3500 $^{1}/_{min}$
消防型最高转速 / max. speed ex	2650 $^{1}/_{min}$



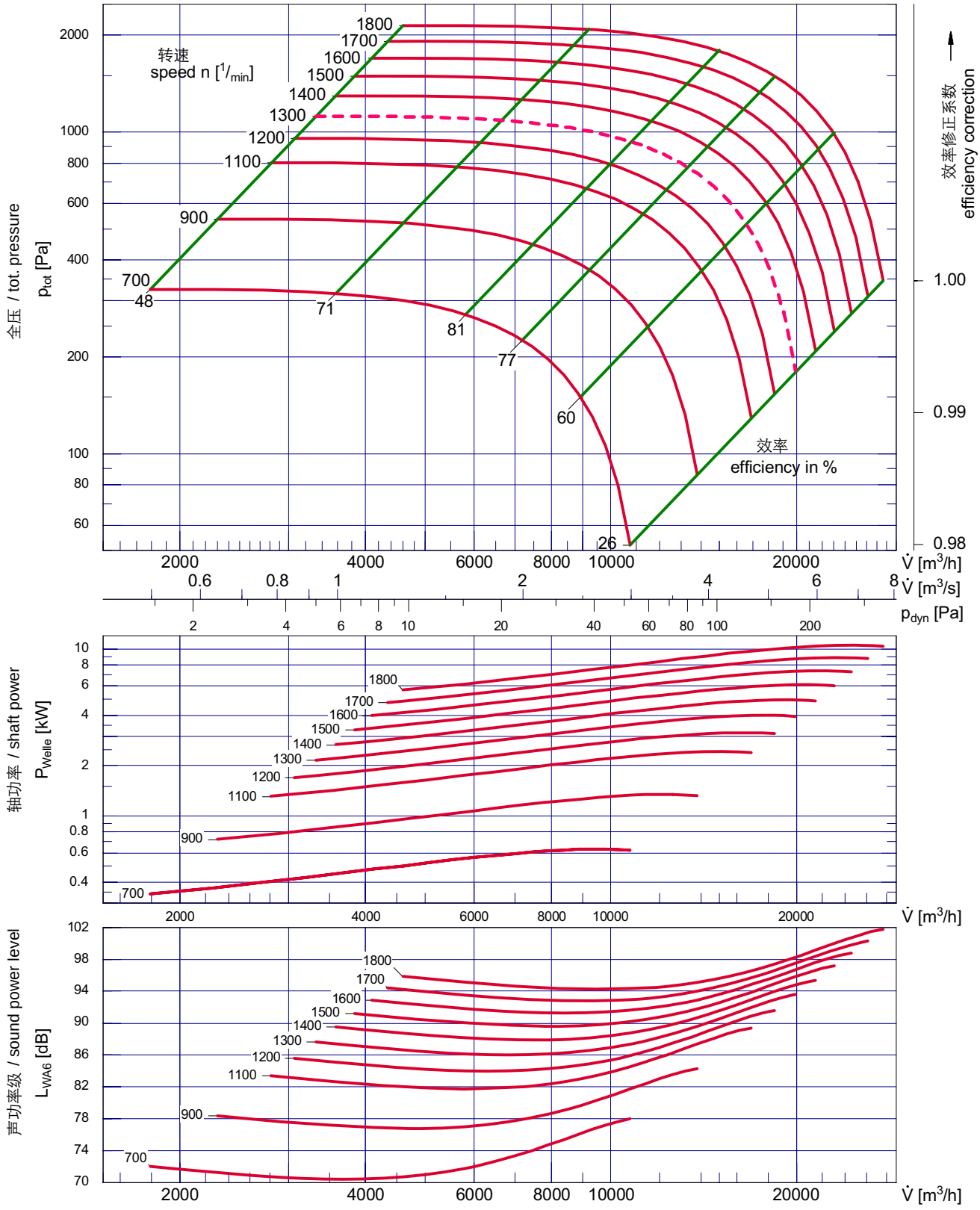
最高转速 / max. speed	3200 $^1/_{min}$
消防型最高转速 / max. speed ex	2450 $^1/_{min}$



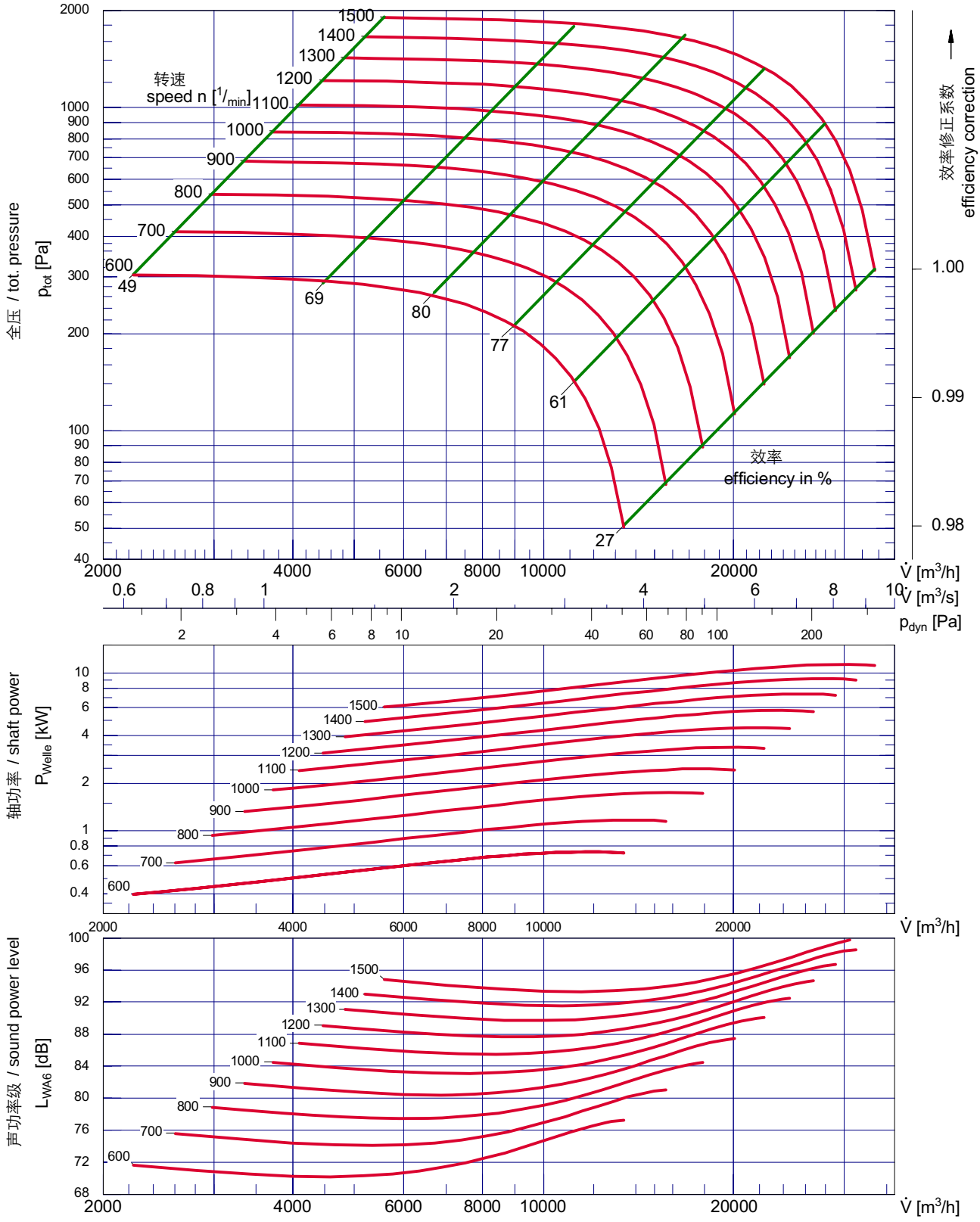
最高转速 / max. speed	3500 $^{1}/_{min}$
消防型最高转速 / max. speed ex	2650 $^{1}/_{min}$



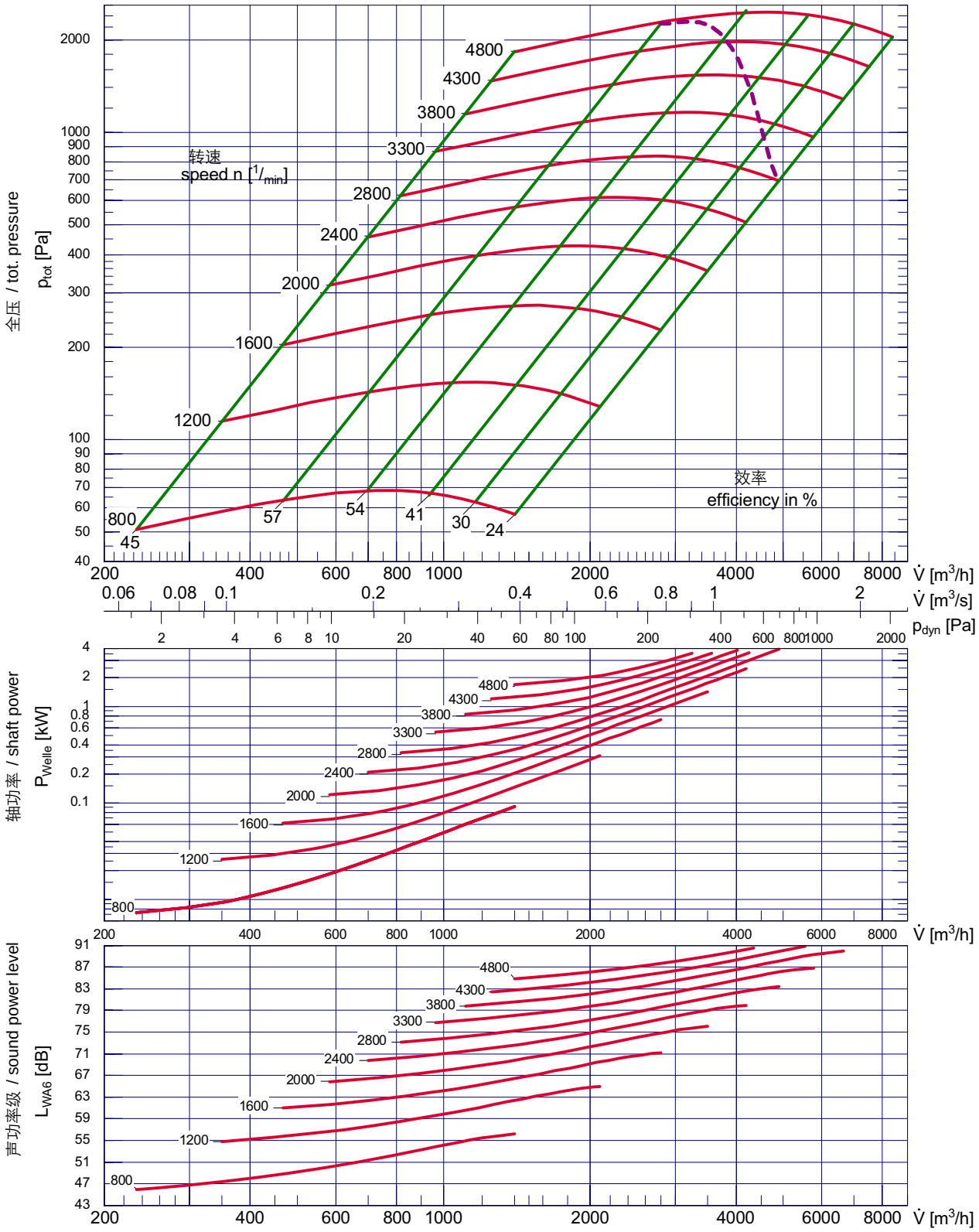
最高转速 / max. speed	1900 $^{1}/_{min}$
消防型最高转速 / max. speed ex	1450 $^{1}/_{min}$



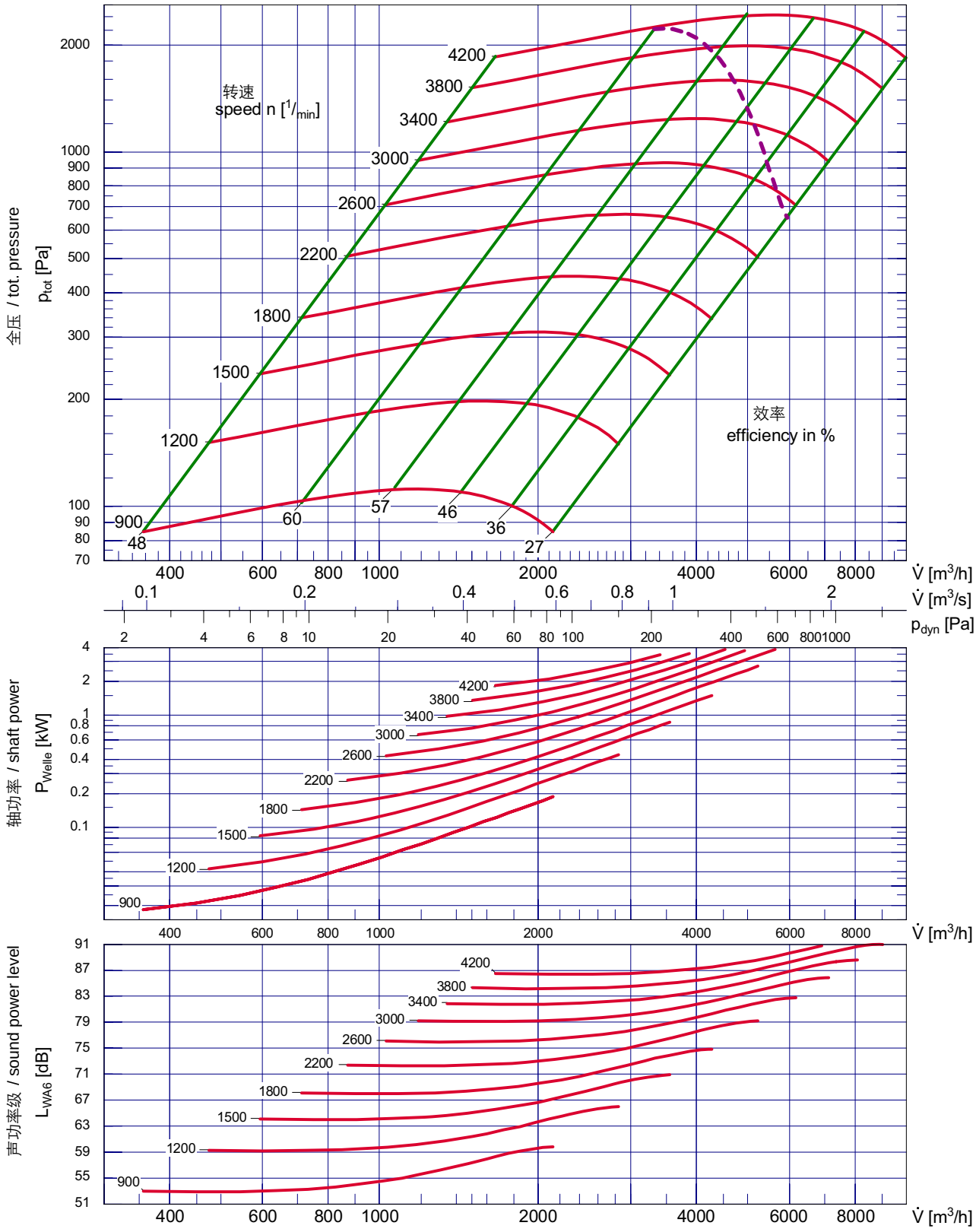
最高转速 / max. speed	1800 $^1/_{min}$
消防型最高转速 / max. speed ex	1350 $^1/_{min}$



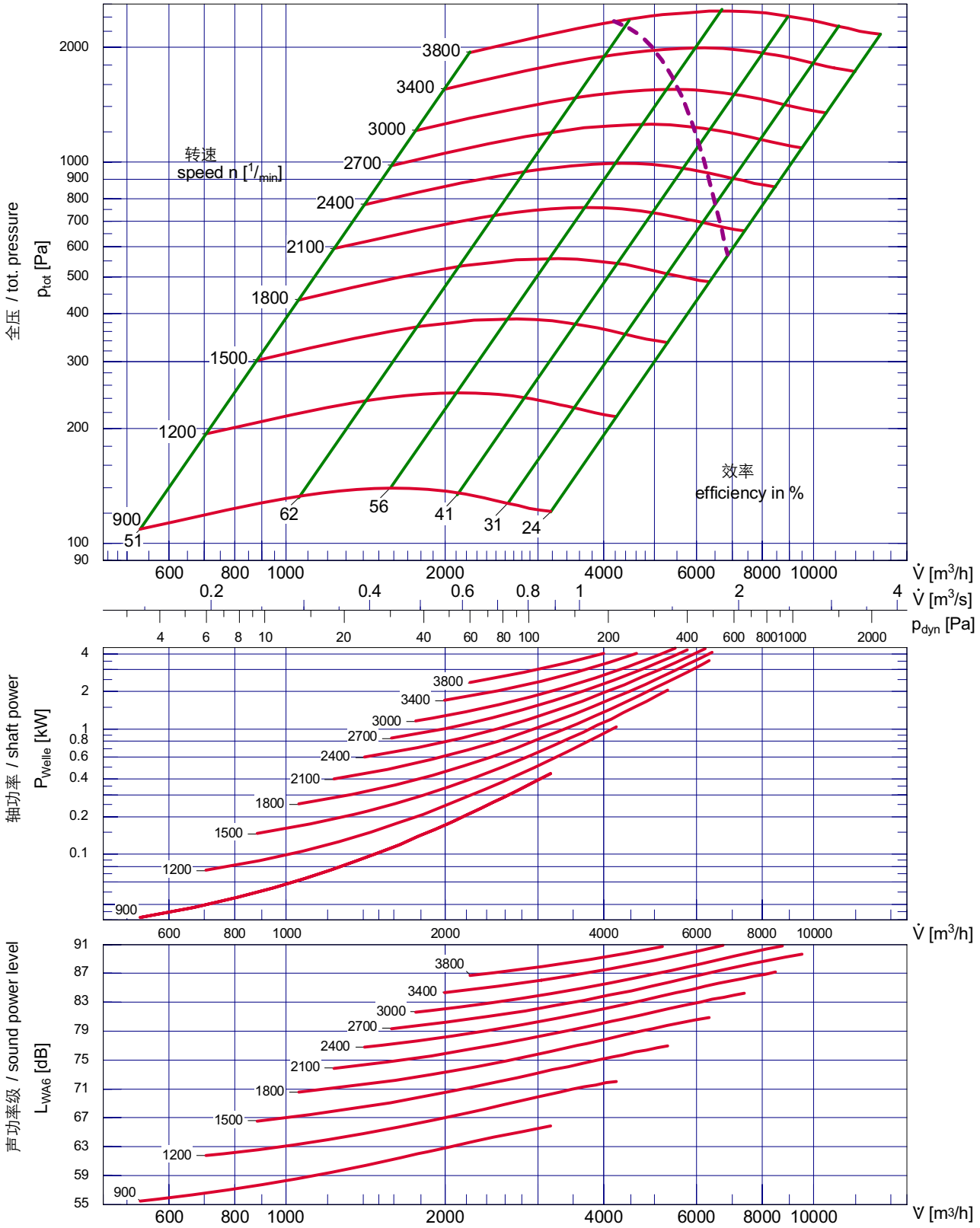
最高转速 / max. speed	1500 $^1/_{min}$
消防型最高转速 / max. speed ex	1100 $^1/_{min}$



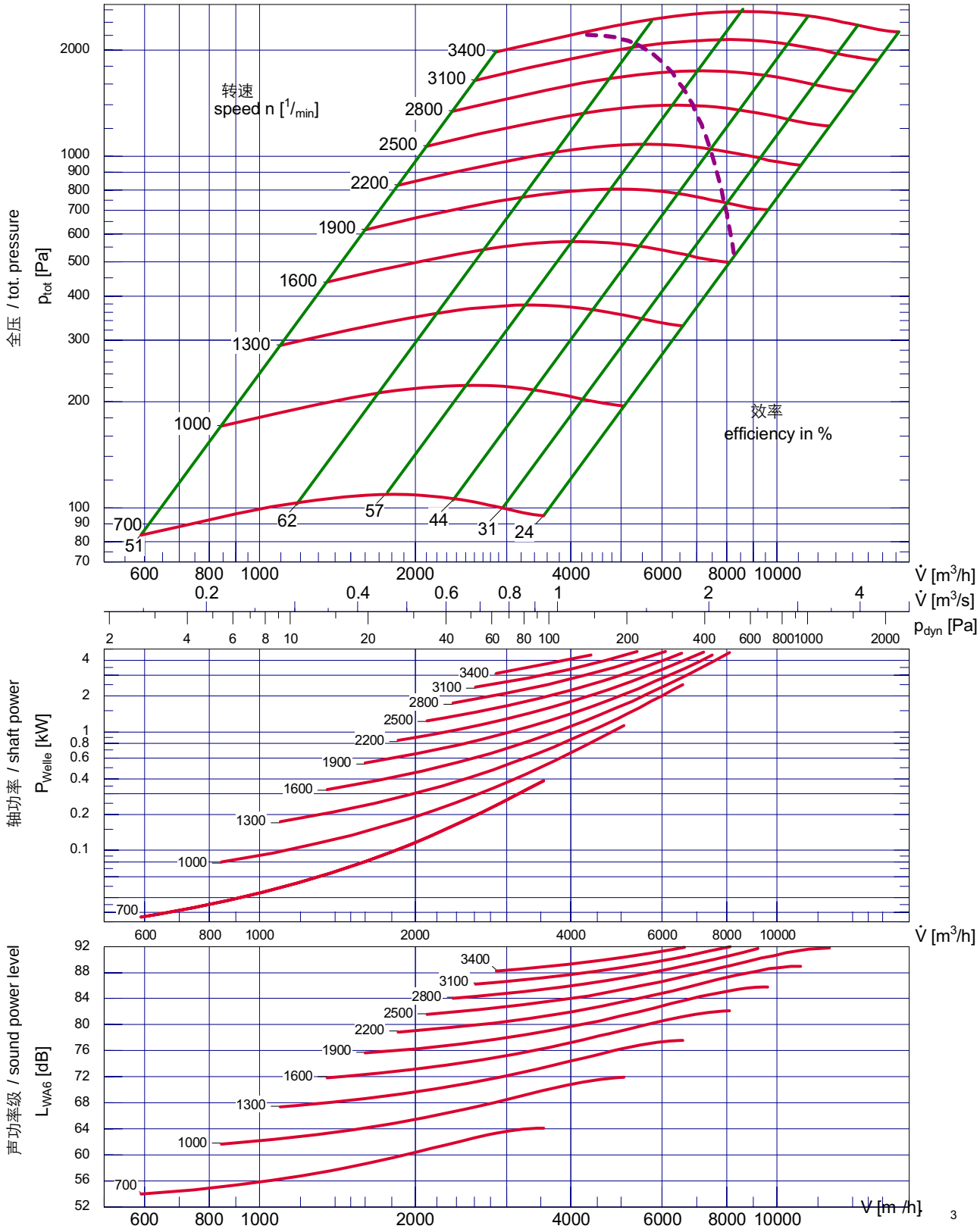
最高转速 / max. speed	4750 $^1/_{min}$
消防型最高转速 / max. speed ex	3950 $^1/_{min}$



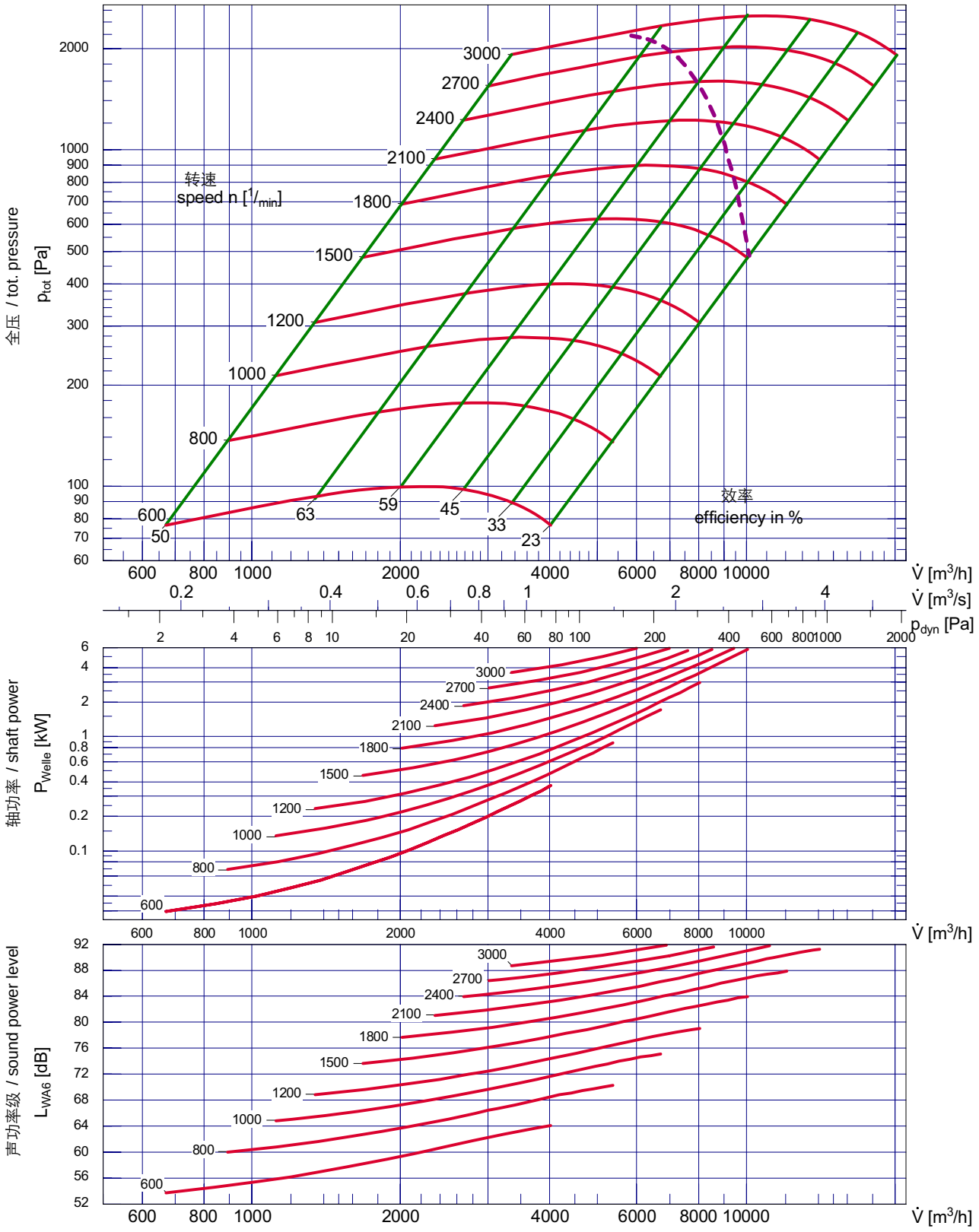
最高转速 / max. speed	4150 $^{1}/_{min}$
消防型最高转速 / max. speed ex	3500 $^{1}/_{min}$



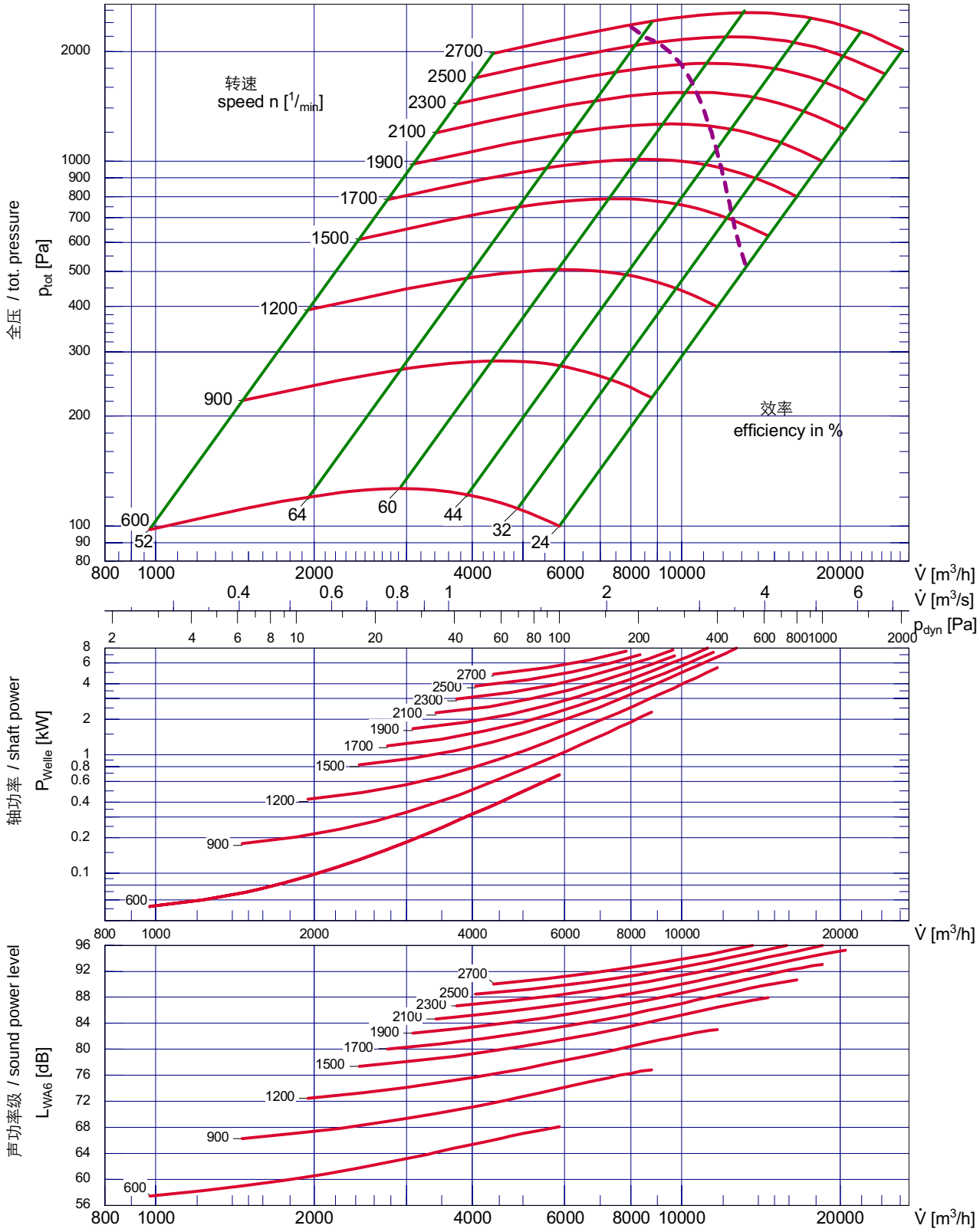
最高转速 / max. speed	3800 $^1/_{min}$
消防型最高转速 / max. speed ex	3150 $^1/_{min}$



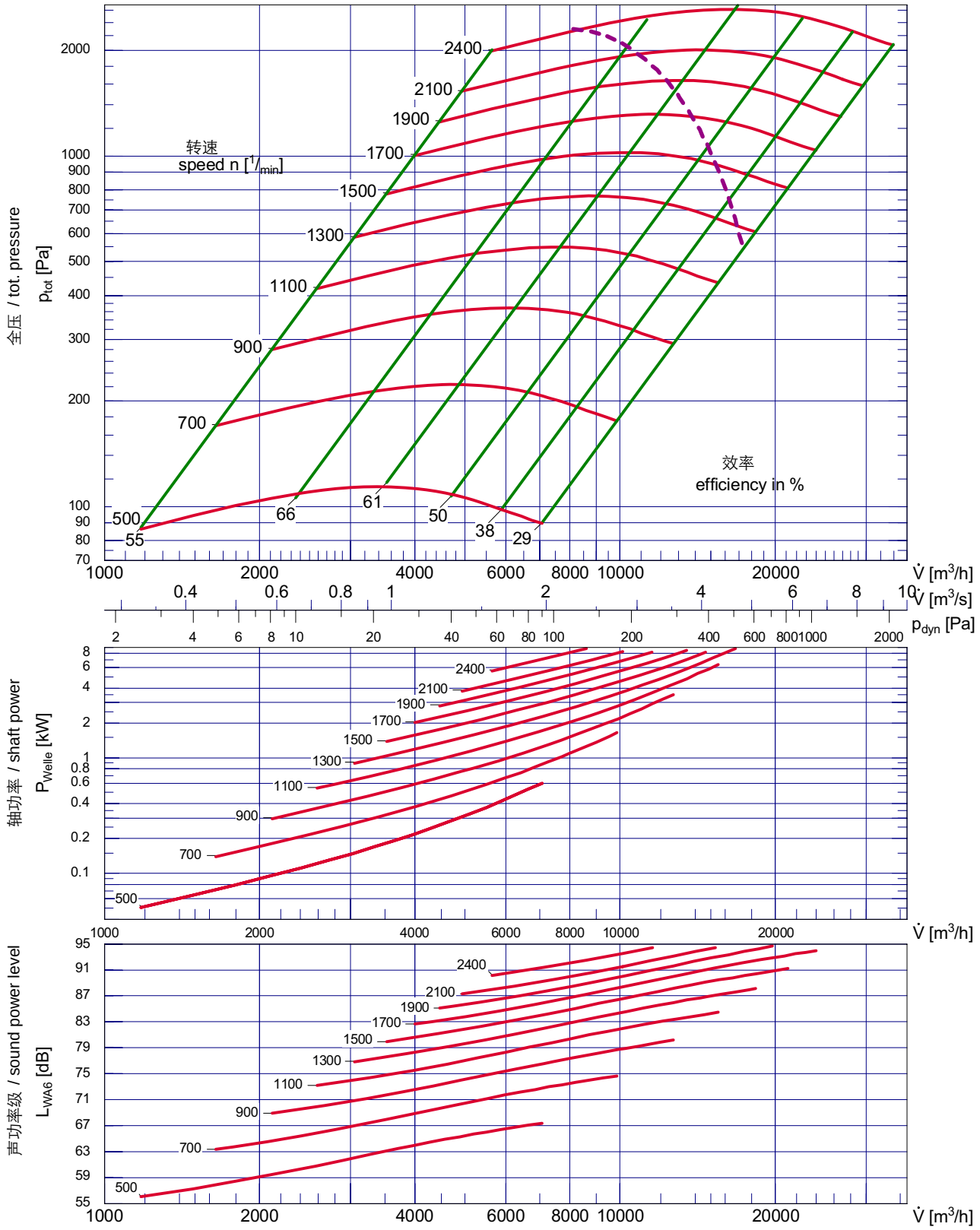
最高转速 / max. speed	3400 $^1/_{min}$
消防型最高转速 / max. speed ex	2830 $^1/_{min}$



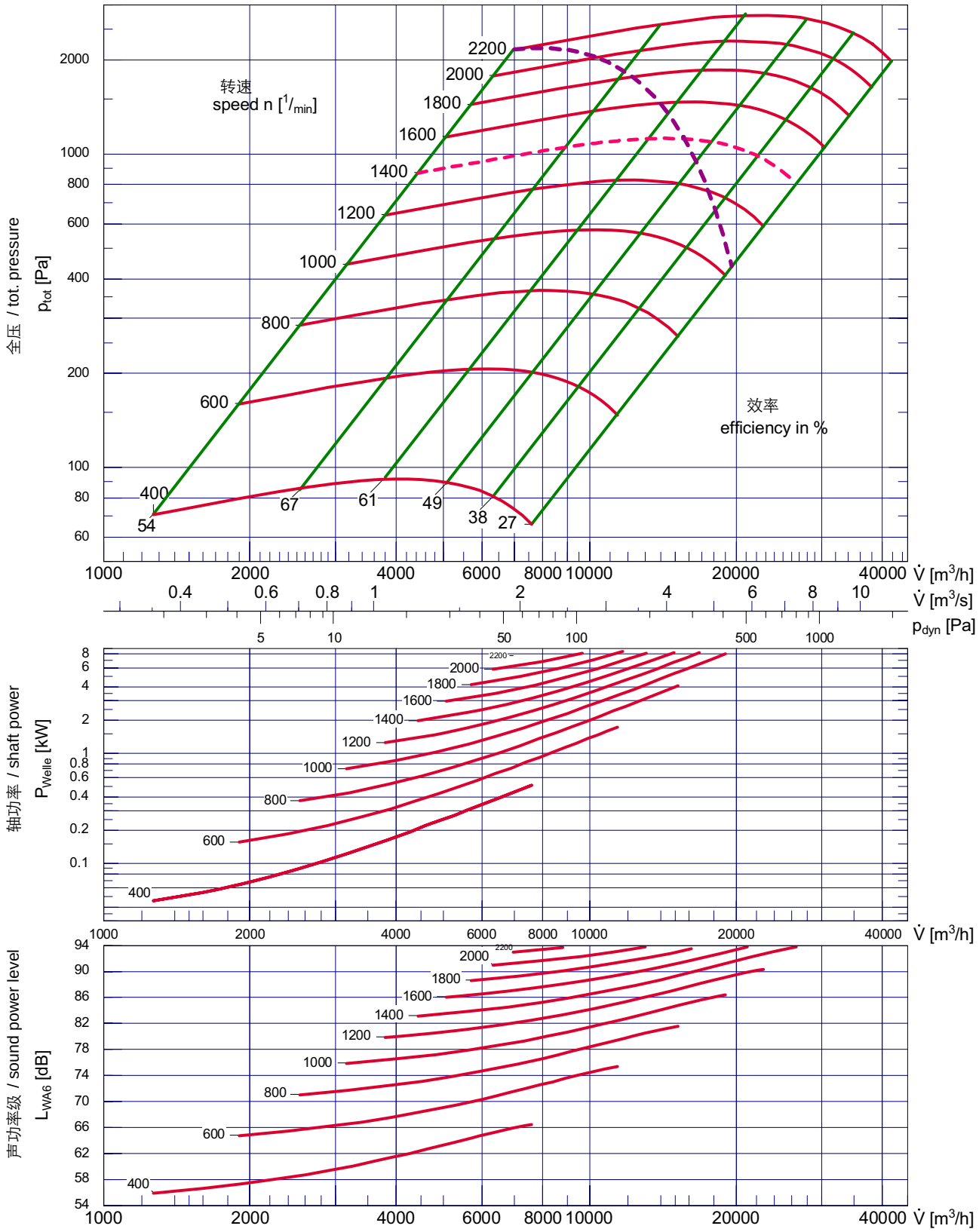
最高转速 / max. speed	3000 $^1/_{min}$
消防型最高转速 / max. speed ex	2550 $^1/_{min}$



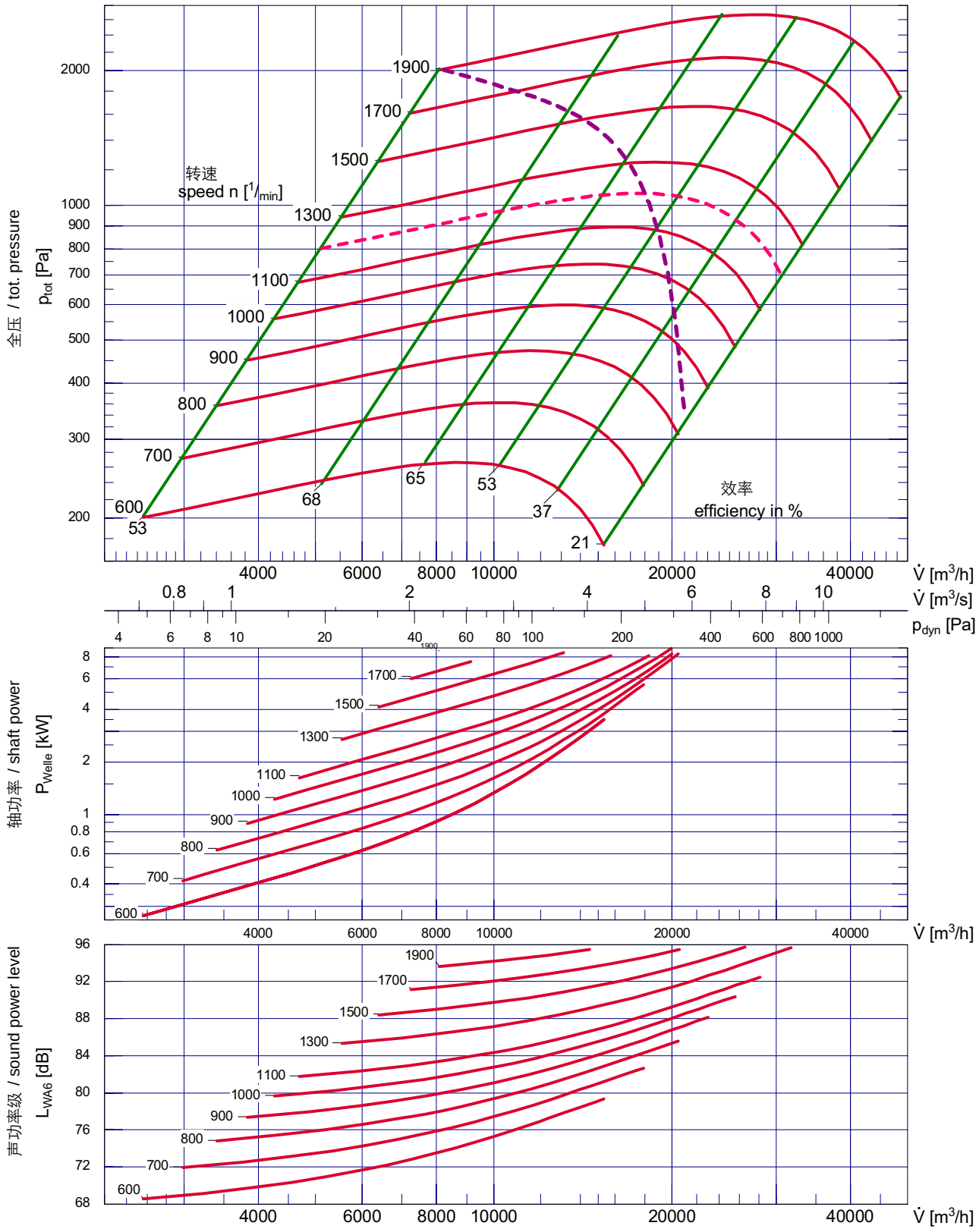
最高转速 / max. speed	2700 $^1/_{min}$
消防型最高转速 / max. speed ex	2250 $^1/_{min}$



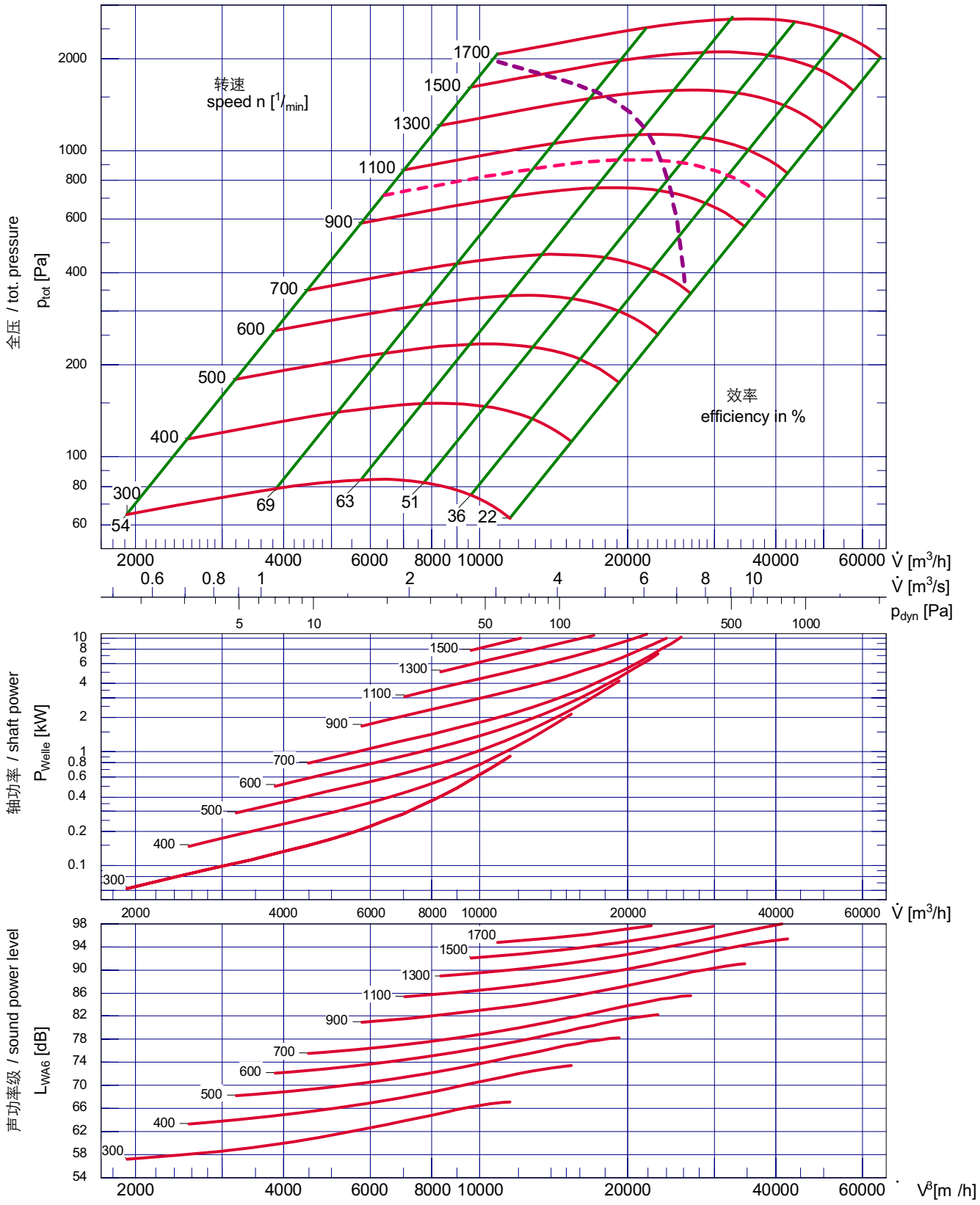
最高转速 / max. speed	2350 $^1/_{min}$
消防型最高转速 / max. speed ex	2000 $^1/_{min}$



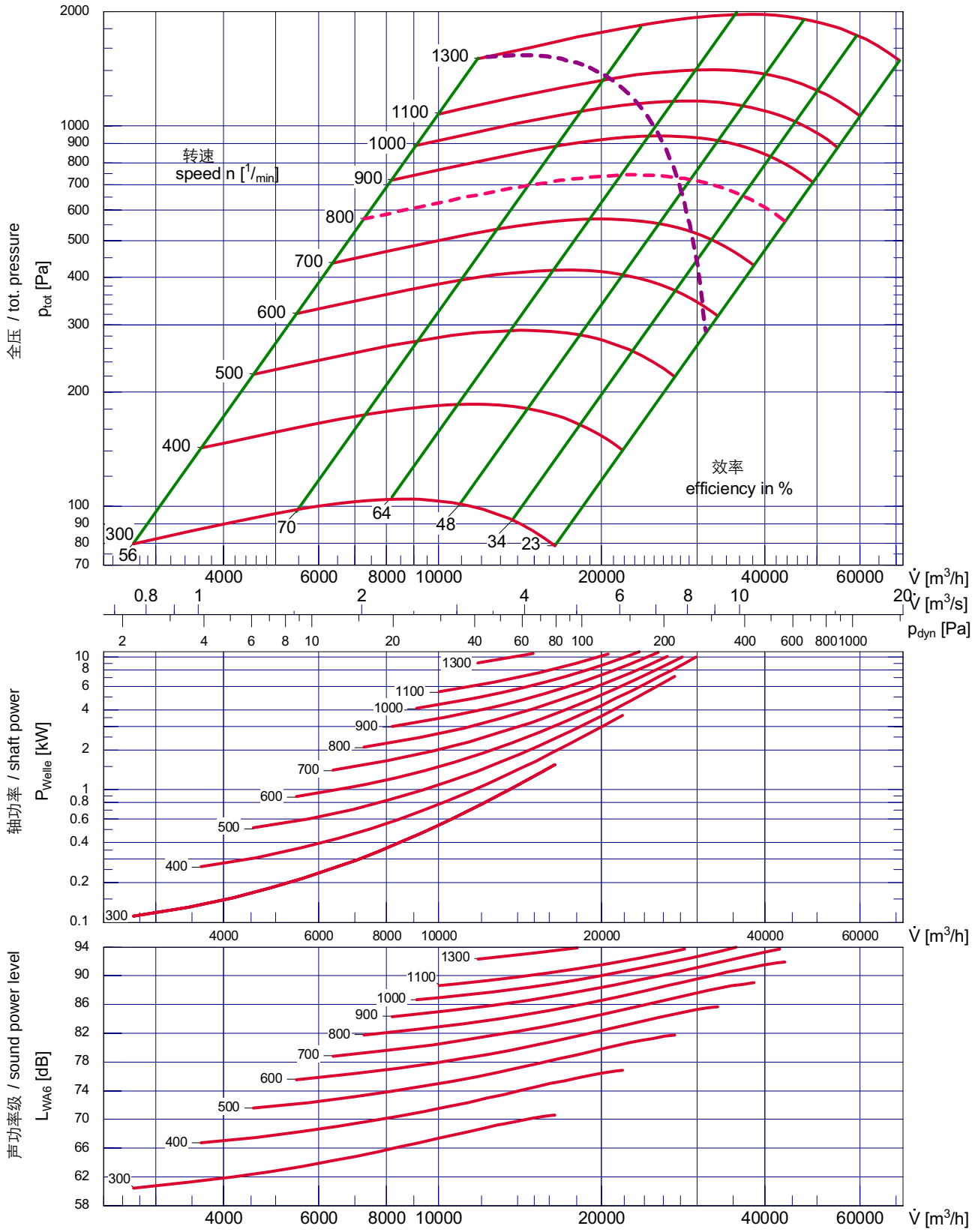
最高转速 / max. speed	2200 $^{1}/_{min}$
消防型最高转速 / max. speed ex	1750 $^{1}/_{min}$



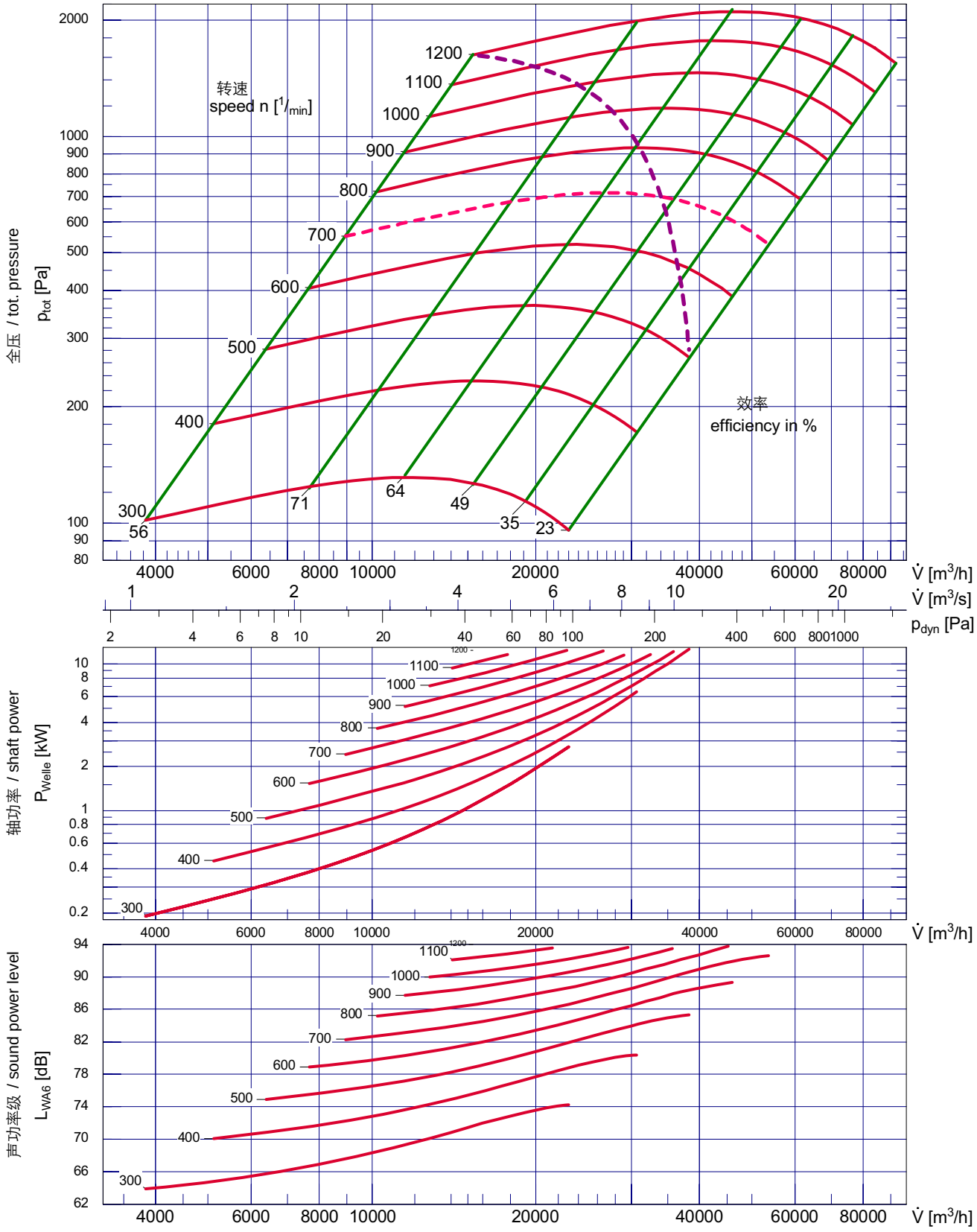
最高转速 / max. speed	1900 $^{1}/_{min}$
消防型最高转速 / max. speed ex	1550 $^{1}/_{min}$



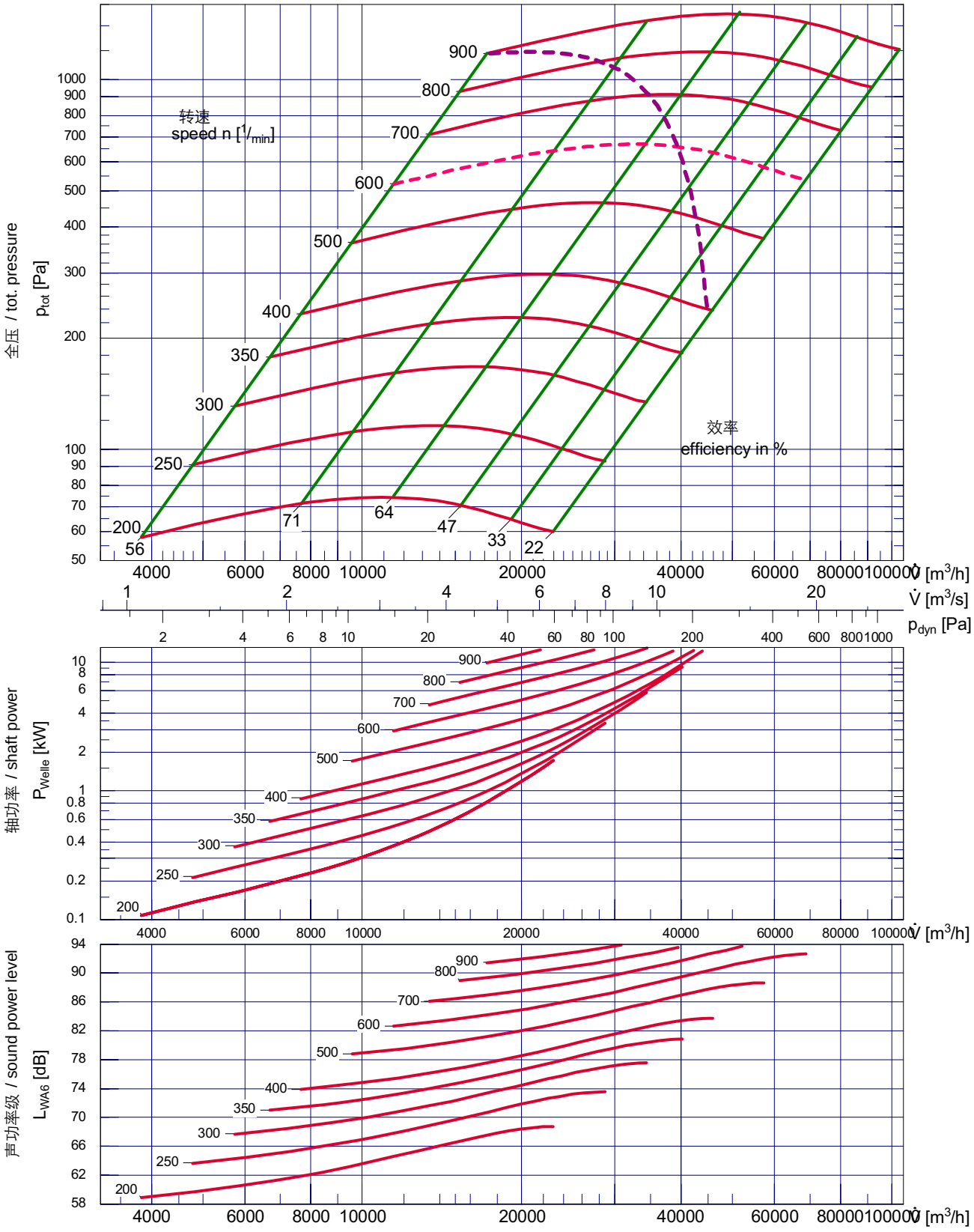
最高转速 / max. speed	1700 $^{1}/_{min}$
消防型最高转速 / max. speed ex	1410 $^{1}/_{min}$



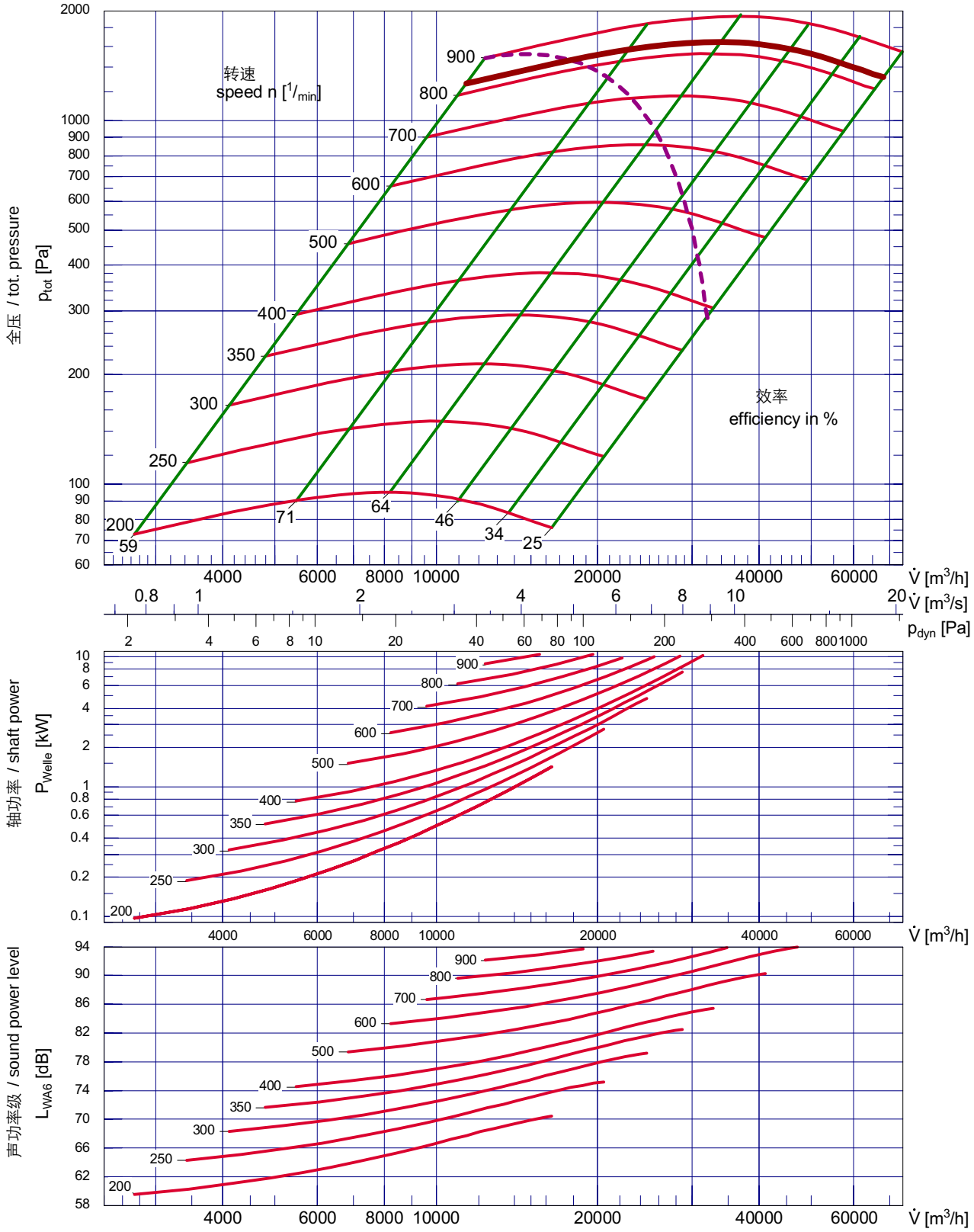
最高转速 / max. speed	1800 $^1/_{min}$
消防型最高转速 / max. speed ex	1350 $^1/_{min}$



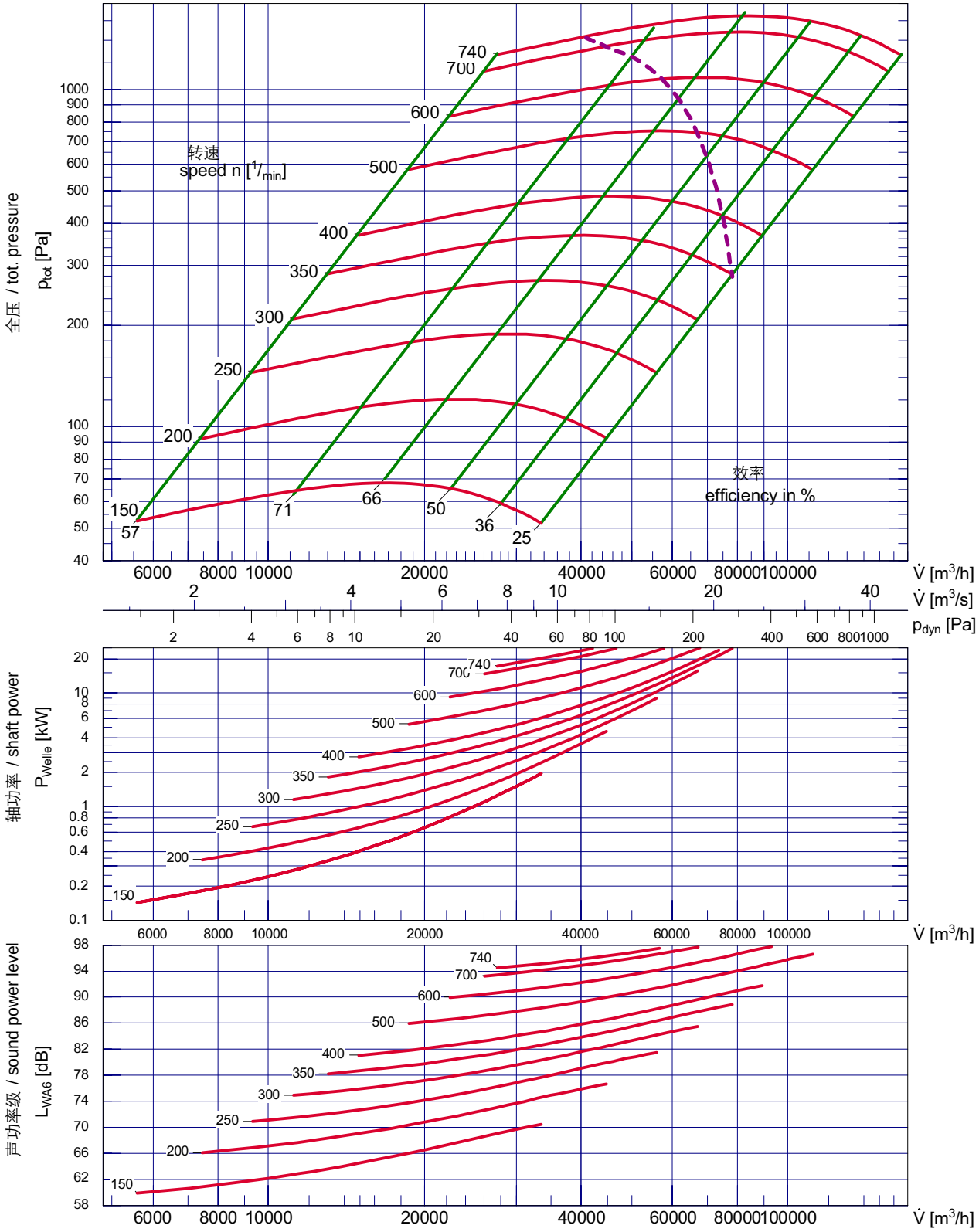
最高转速 / max. speed	1500 $^1/_{min}$
消防型最高转速 / max. speed ex	1250 $^1/_{min}$



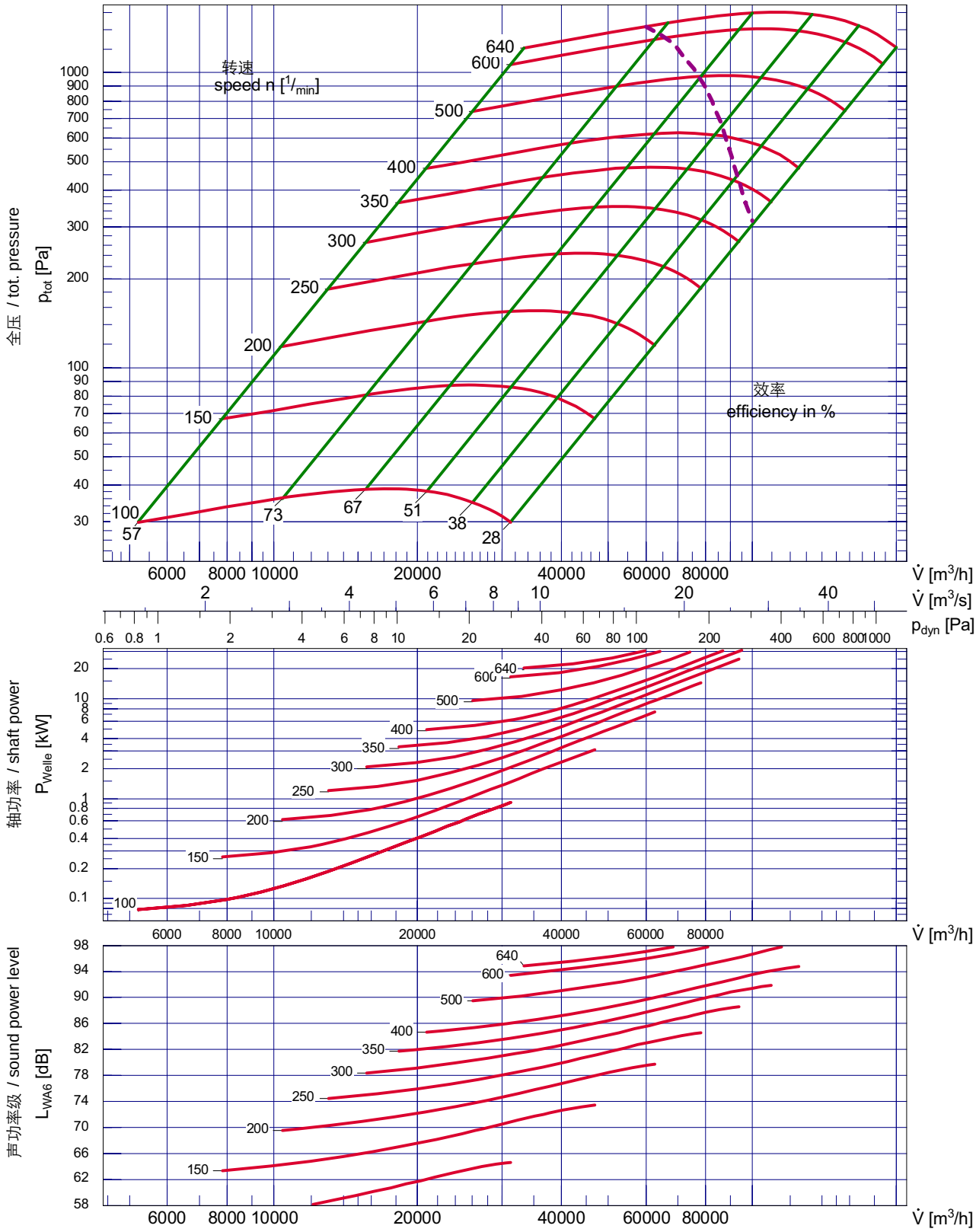
最高转速 / max. speed	1200 $^1/_{min}$
消防型最高转速 / max. speed ex	950 $^1/_{min}$



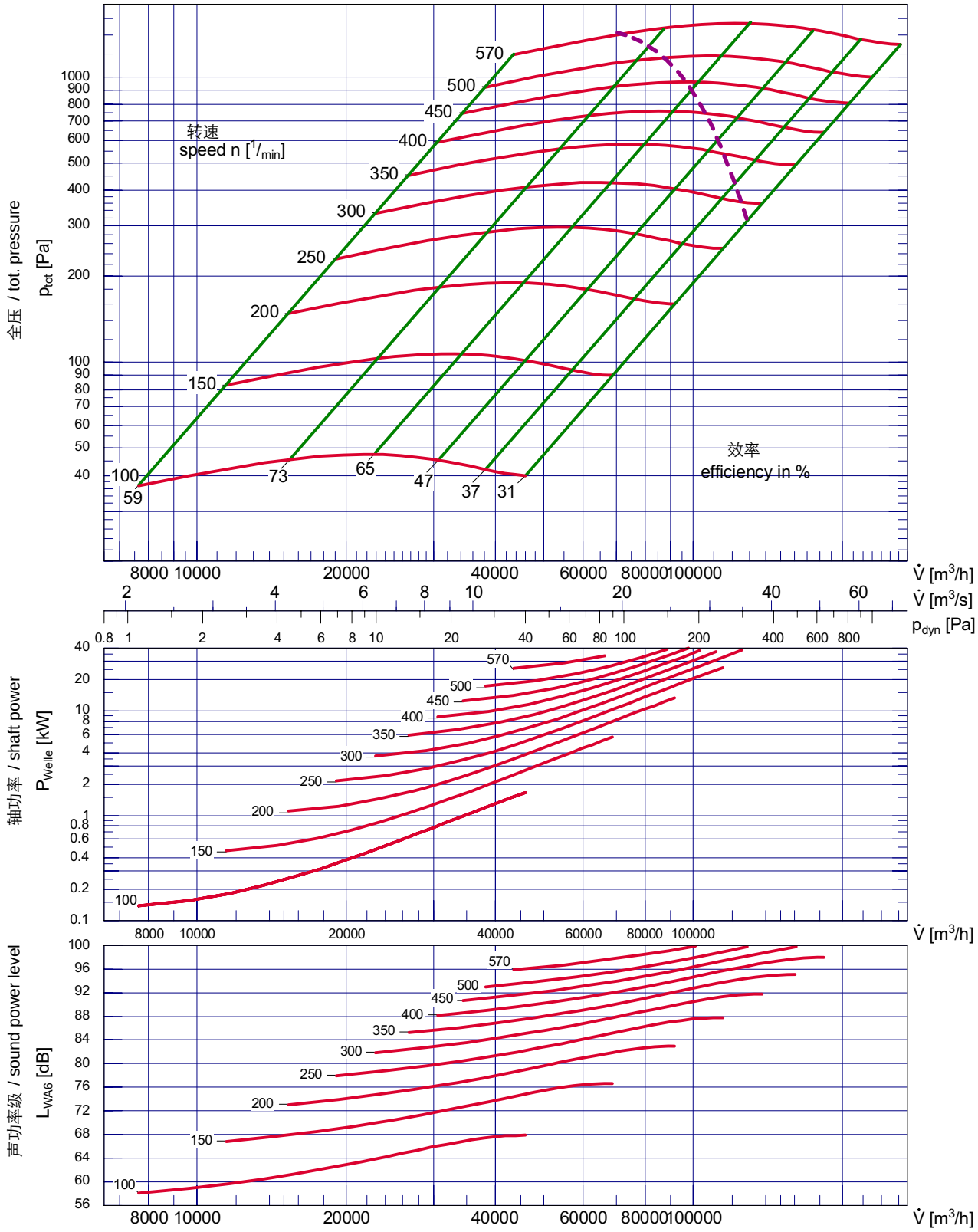
最高转速 / max. speed	840 $^{1}/_{min}$
消防型最高转速 / max. speed ex	650 $^{1}/_{min}$



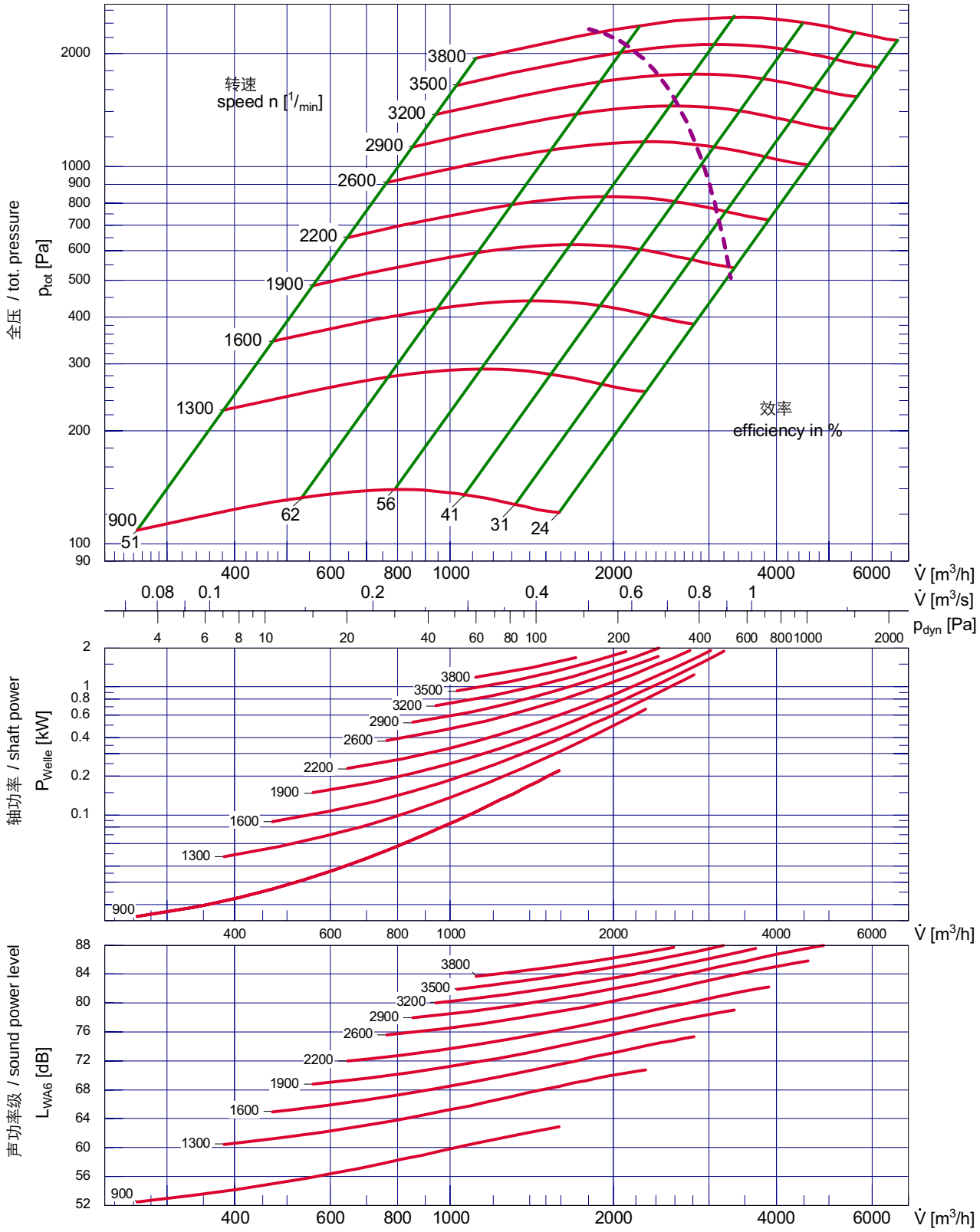
最高转速 / max. speed	740 $^1/_{min}$
消防型最高转速 / max. speed ex	600 $^1/_{min}$



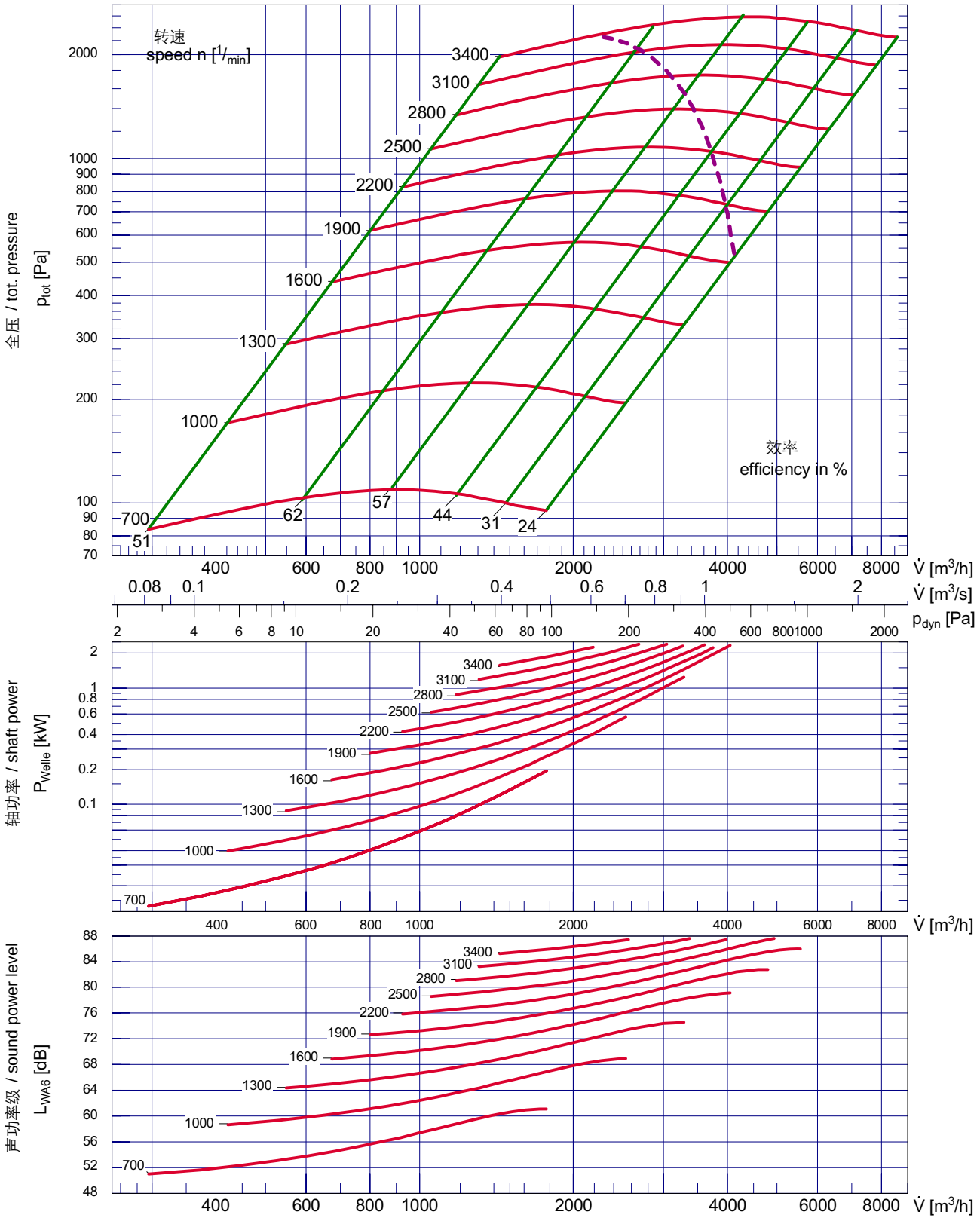
最高转速 / max. speed	640 $^1/_{min}$
消防型最高转速 / max. speed ex	500 $^1/_{min}$



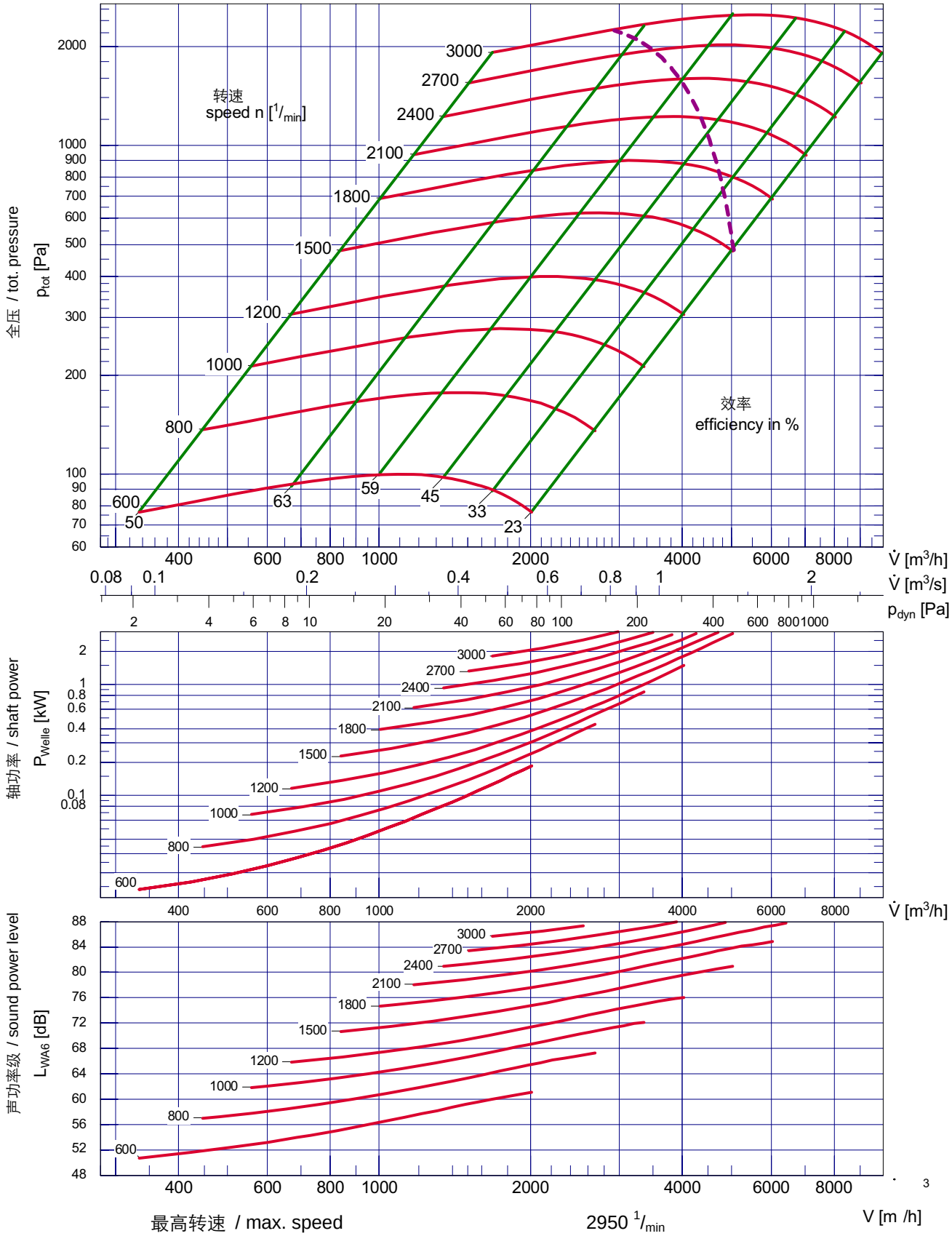
最高转速 / max. speed	570 $^1/_{min}$
消防型最高转速 / max. speed ex	450 $^1/_{min}$



最高转速 / max. speed	3800 $^{1}/_{min}$
消防型最高转速 / max. speed ex	3150 $^{1}/_{min}$

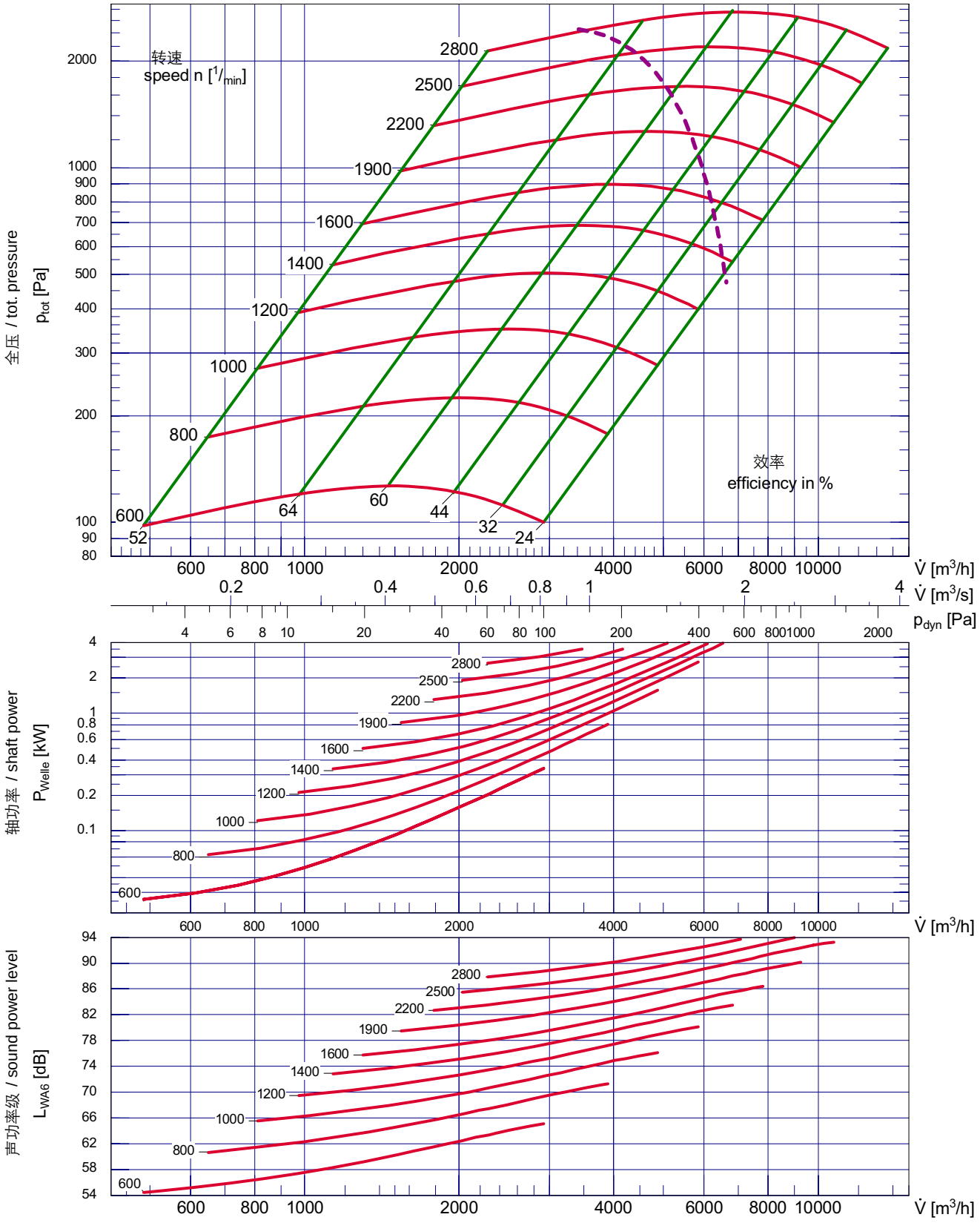


最高转速 / max. speed	3400 $^{1}/_{min}$
消防型最高转速 / max. speed ex	2800 $^{1}/_{min}$

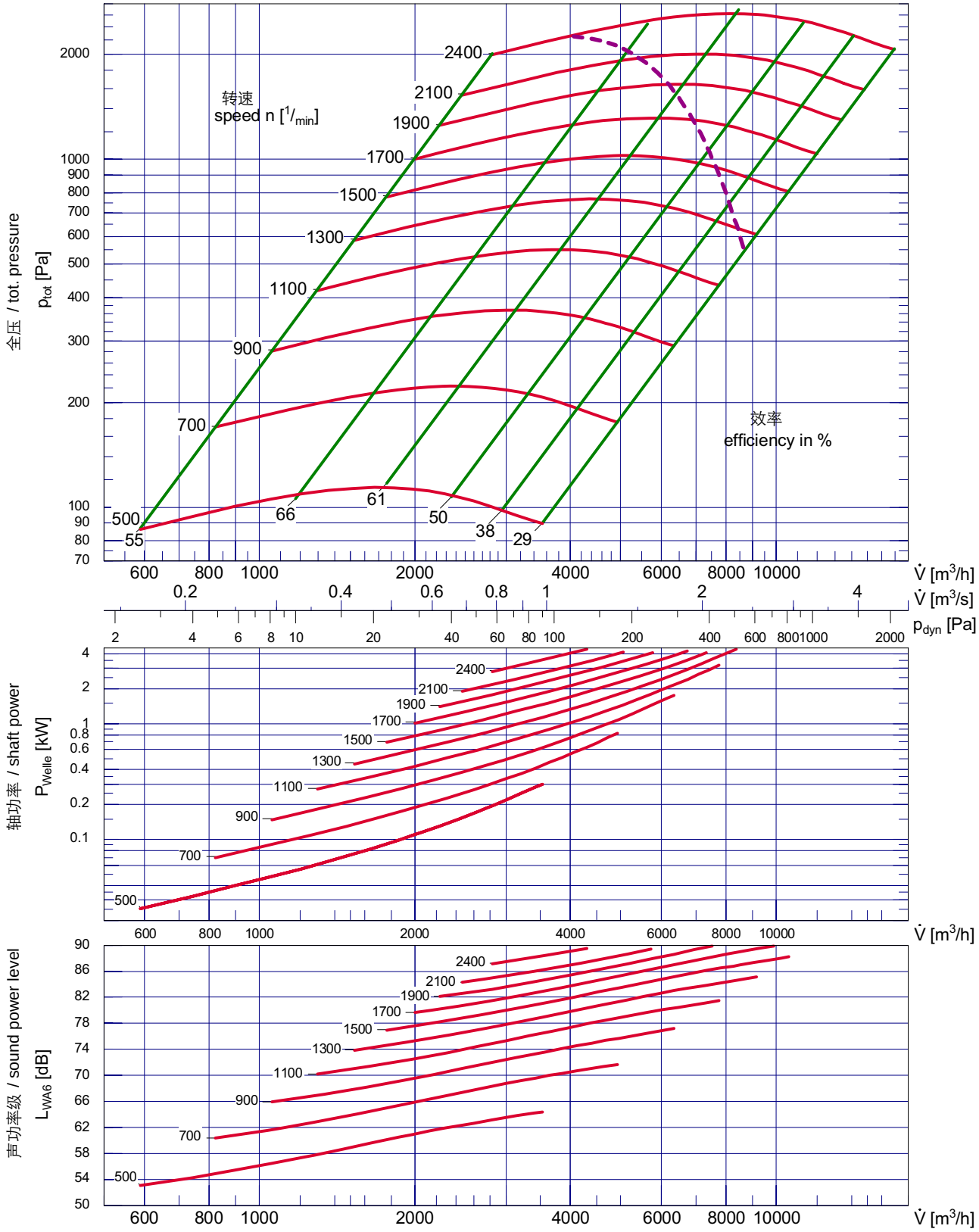


最高转速 / max. speed 2950 $^1/_{min}$

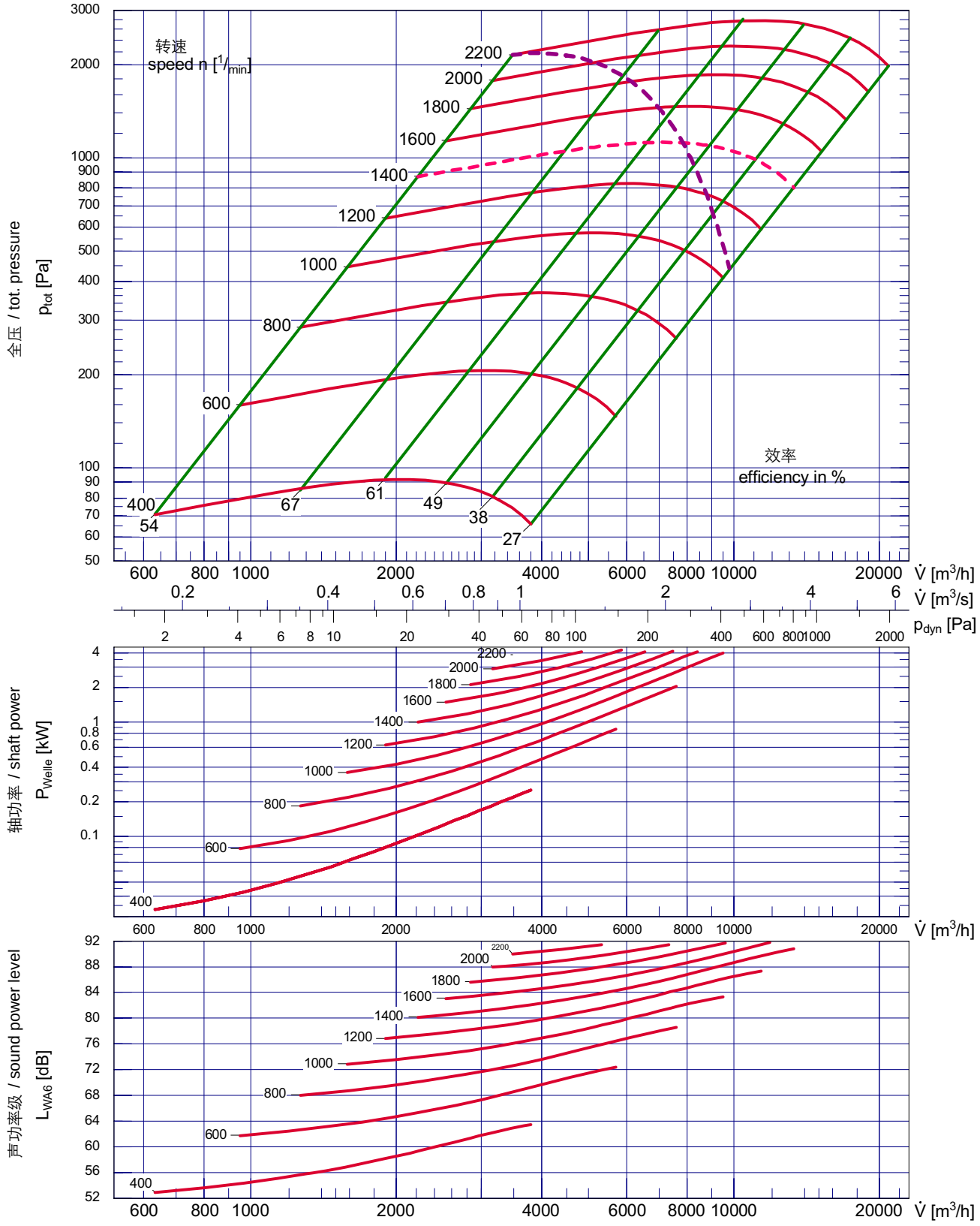
消防型最高转速 / max. speed ex 2550 $^1/_{min}$



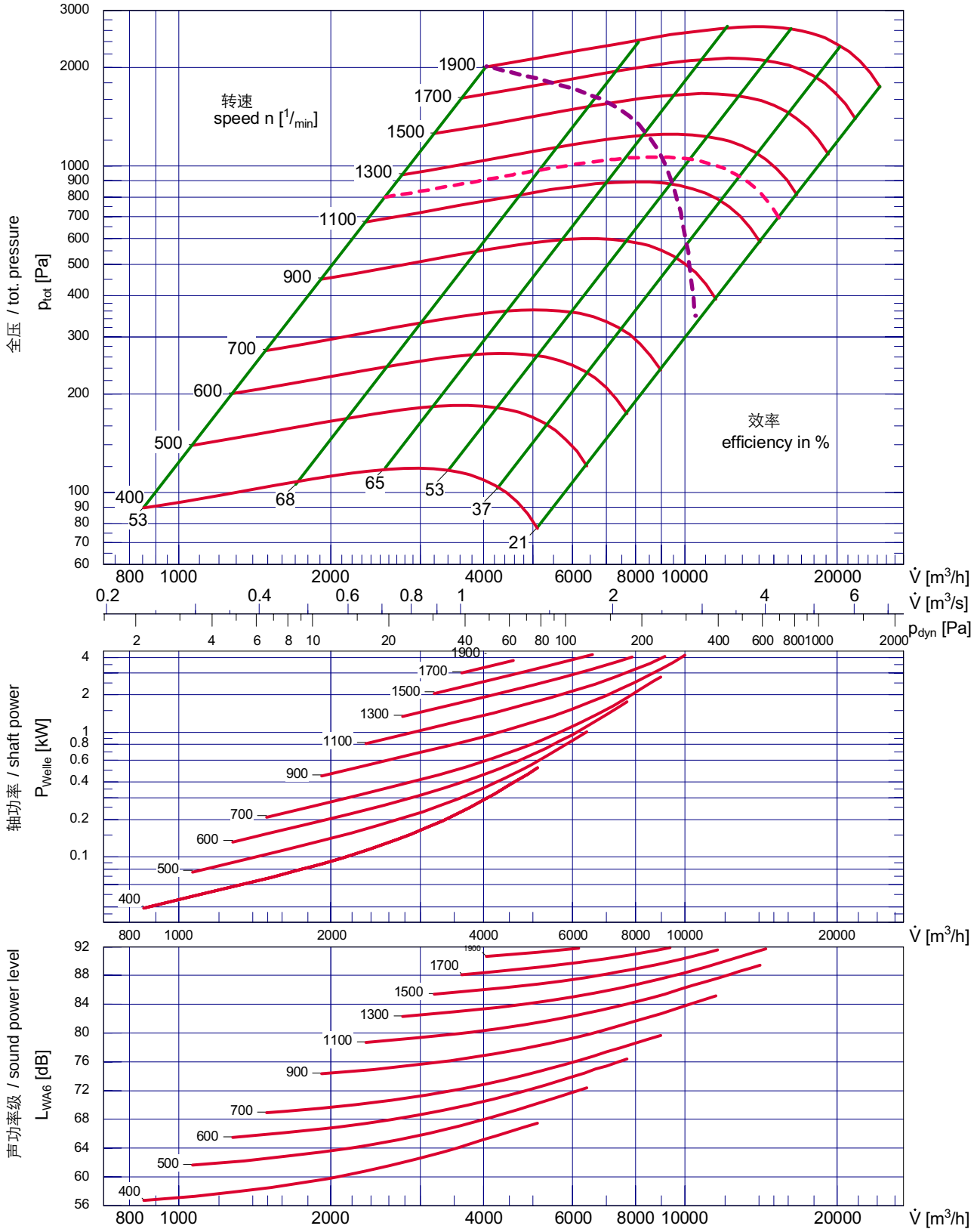
最高转速 / max. speed	2700 $^{1}/_{min}$
消防型最高转速 / max. speed ex	2250 $^{1}/_{min}$



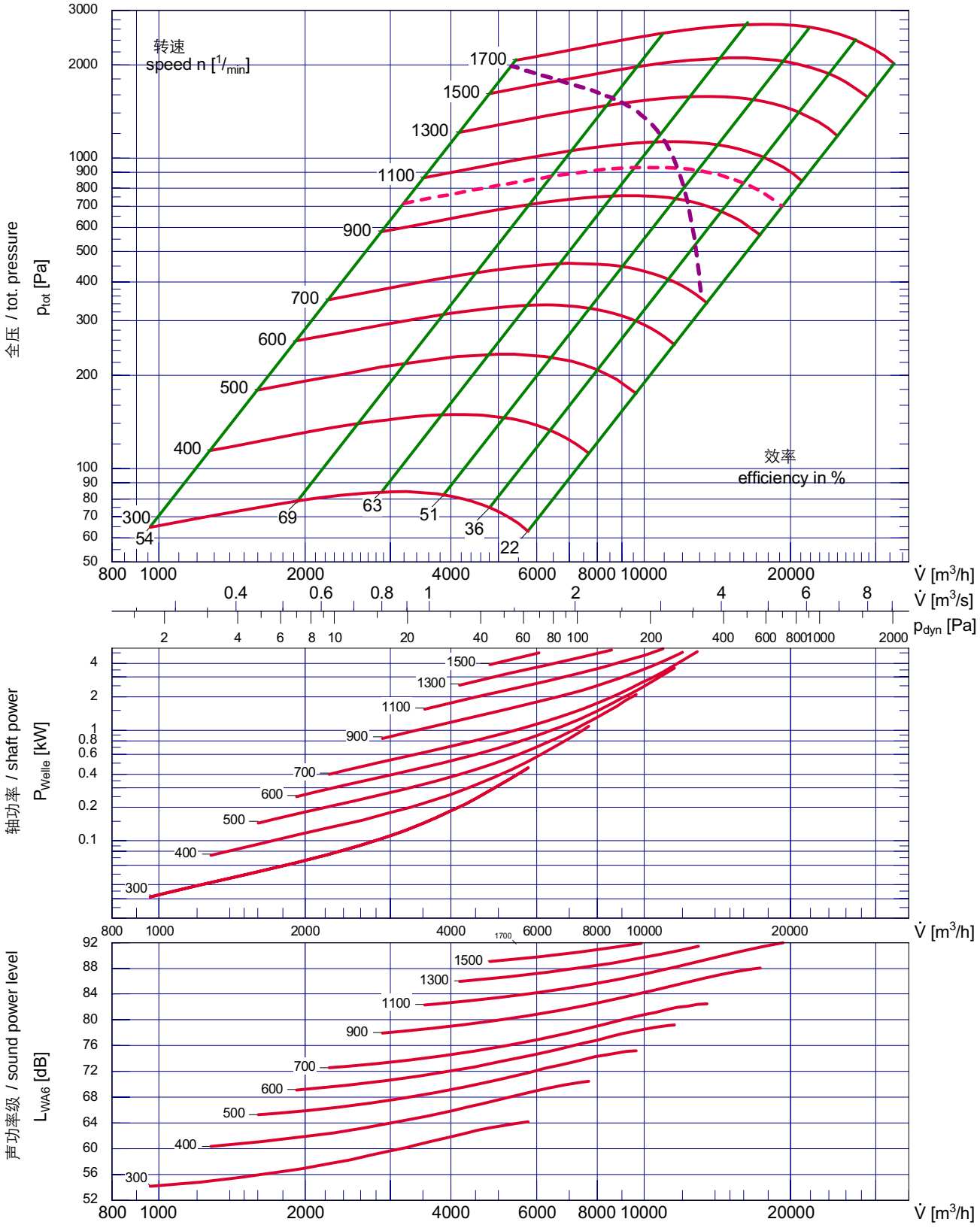
最高转速 / max. speed	2400 $^1/_{min}$
消防型最高转速 / max. speed ex	2000 $^1/_{min}$



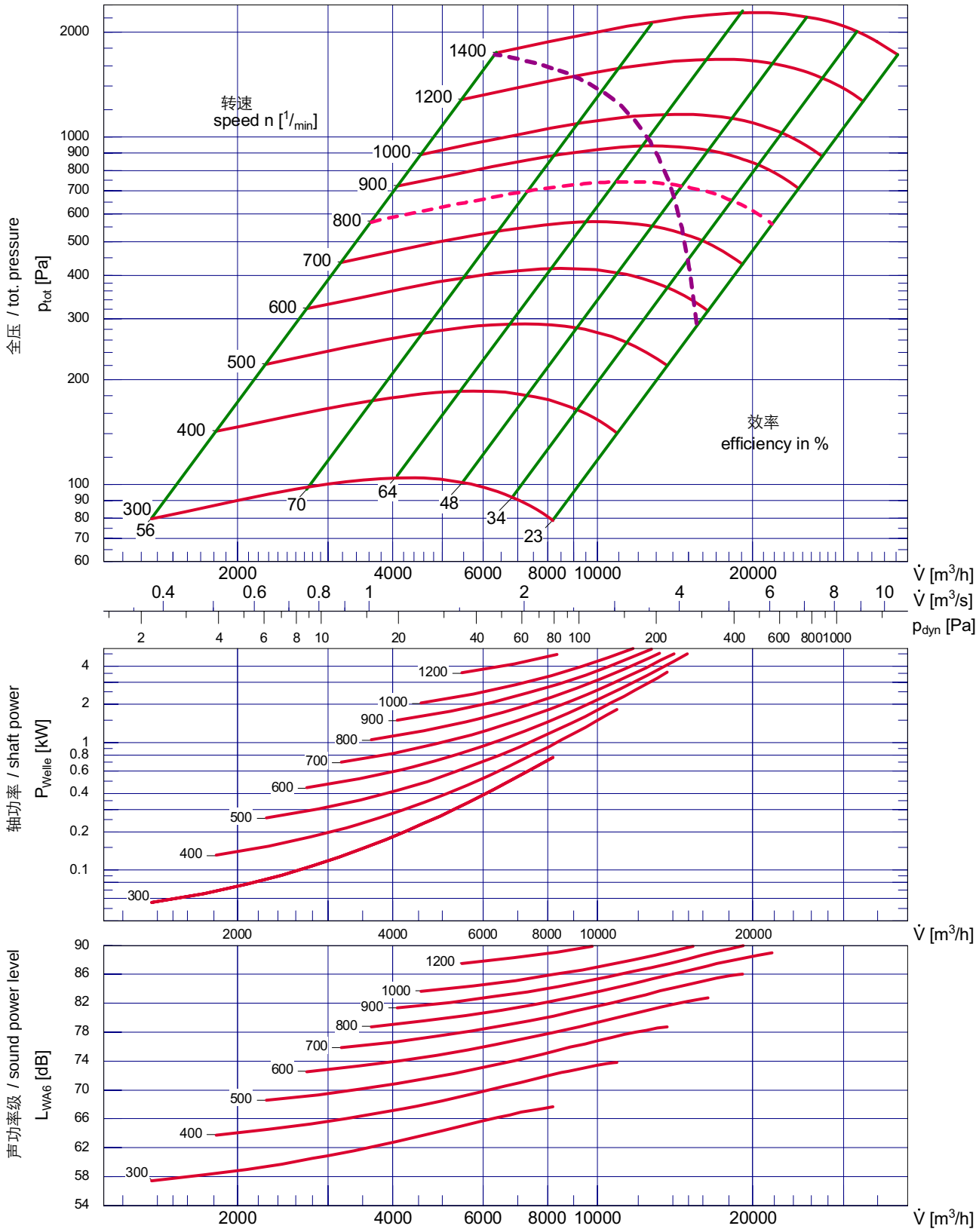
最高转速 / max. speed	2200 $^1/_{min}$
消防型最高转速 / max. speed ex	1750 $^1/_{min}$



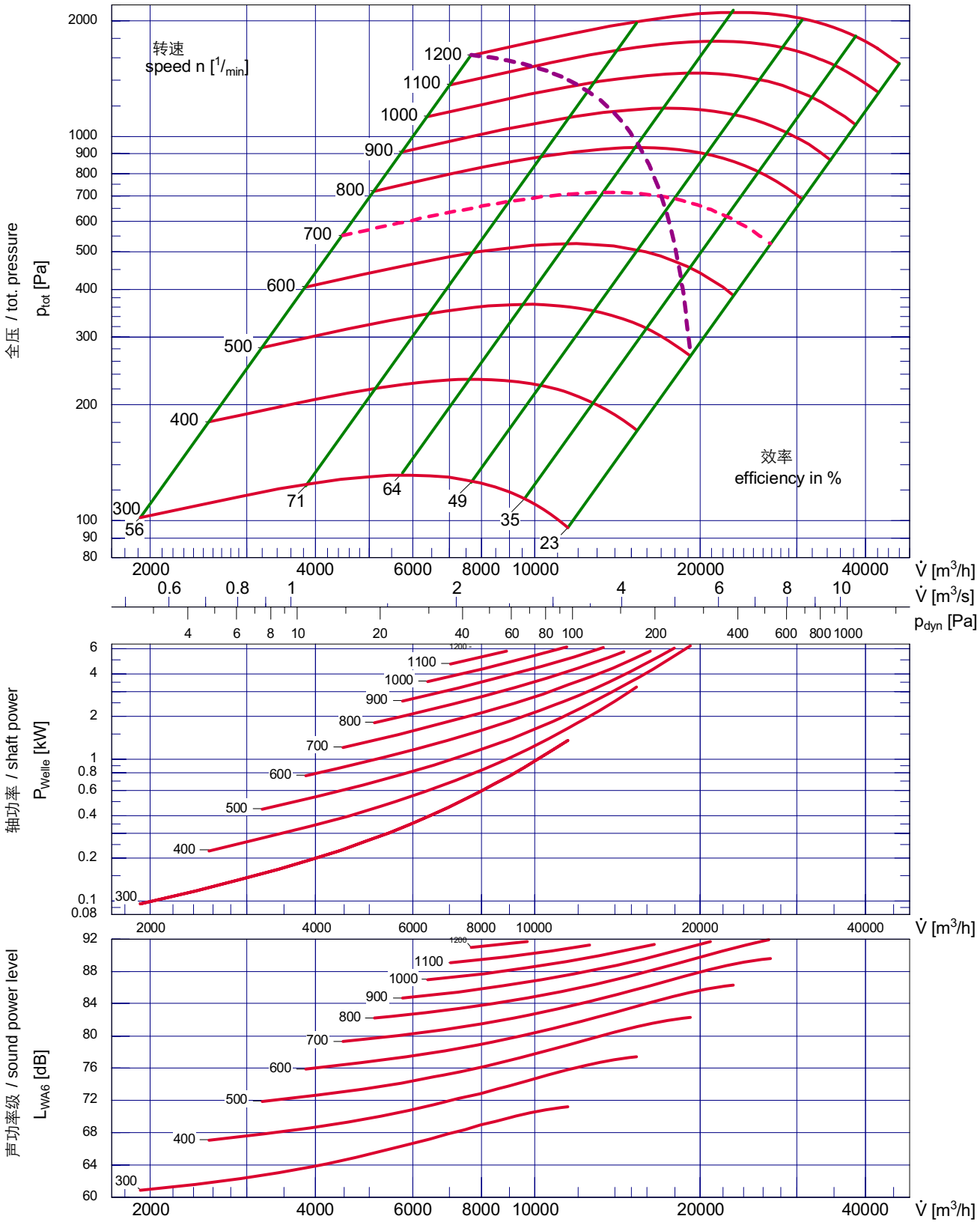
最高转速 / max. speed	1900 $^{1}/_{min}$
消防型最高转速 / max. speed ex	1550 $^{1}/_{min}$



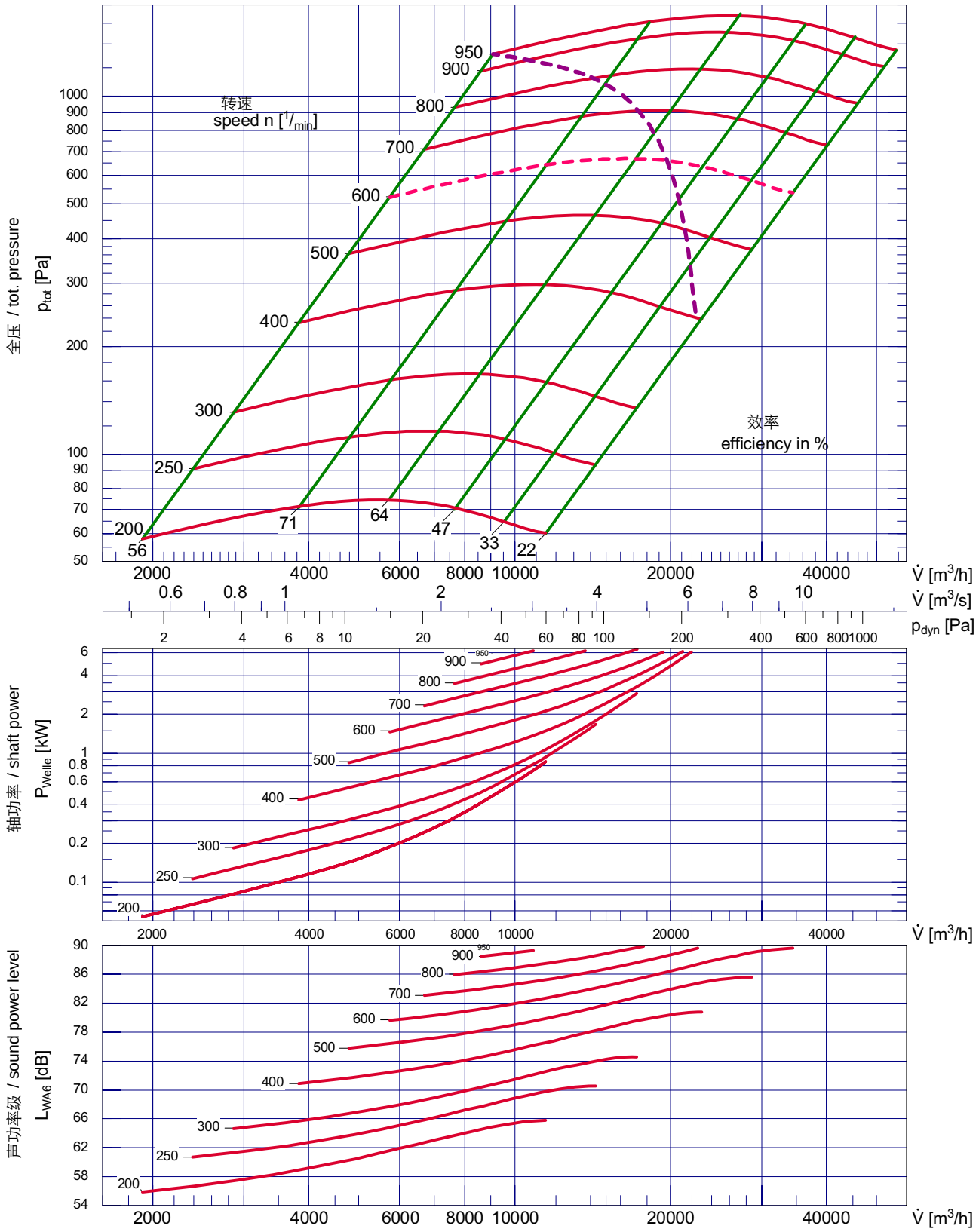
最高转速 / max. speed	1700 $^{1}/_{min}$
消防型最高转速 / max. speed ex	1400 $^{1}/_{min}$



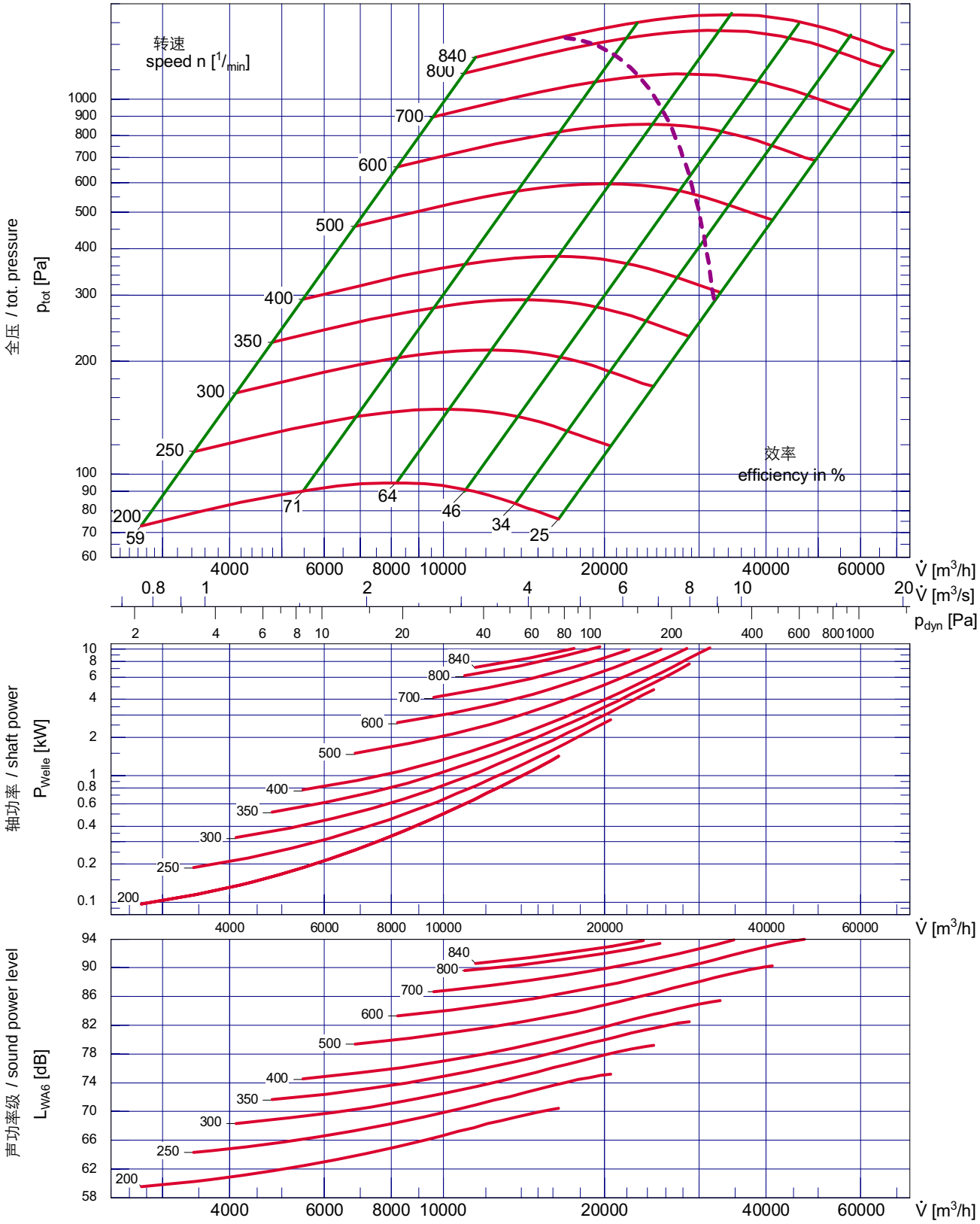
最高转速 / max. speed	1500 $^1/_{min}$
消防型最高转速 / max. speed ex	1250 $^1/_{min}$



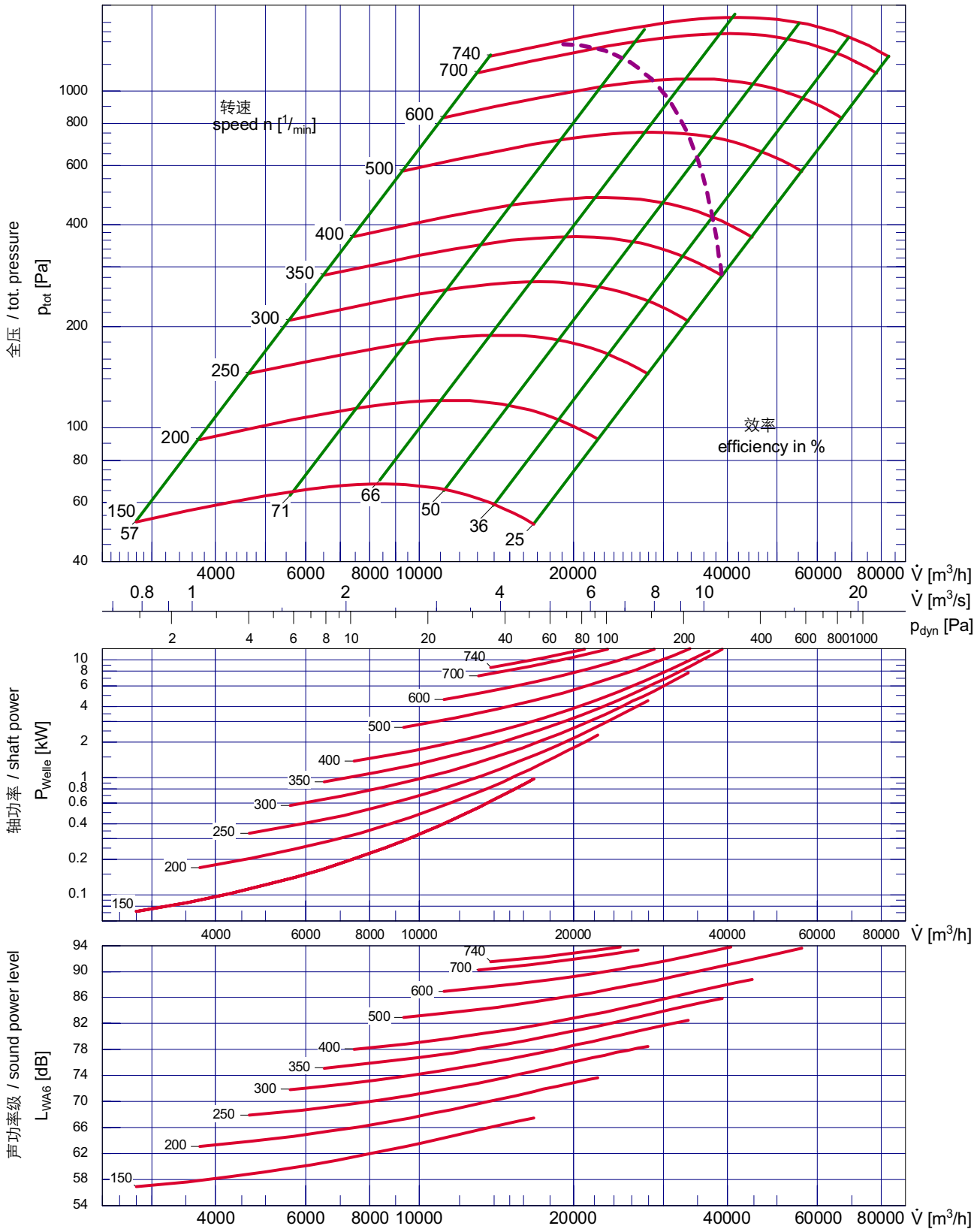
最高转速 / max. speed	1200 $^1/_{min}$
消防型最高转速 / max. speed ex	950 $^1/_{min}$



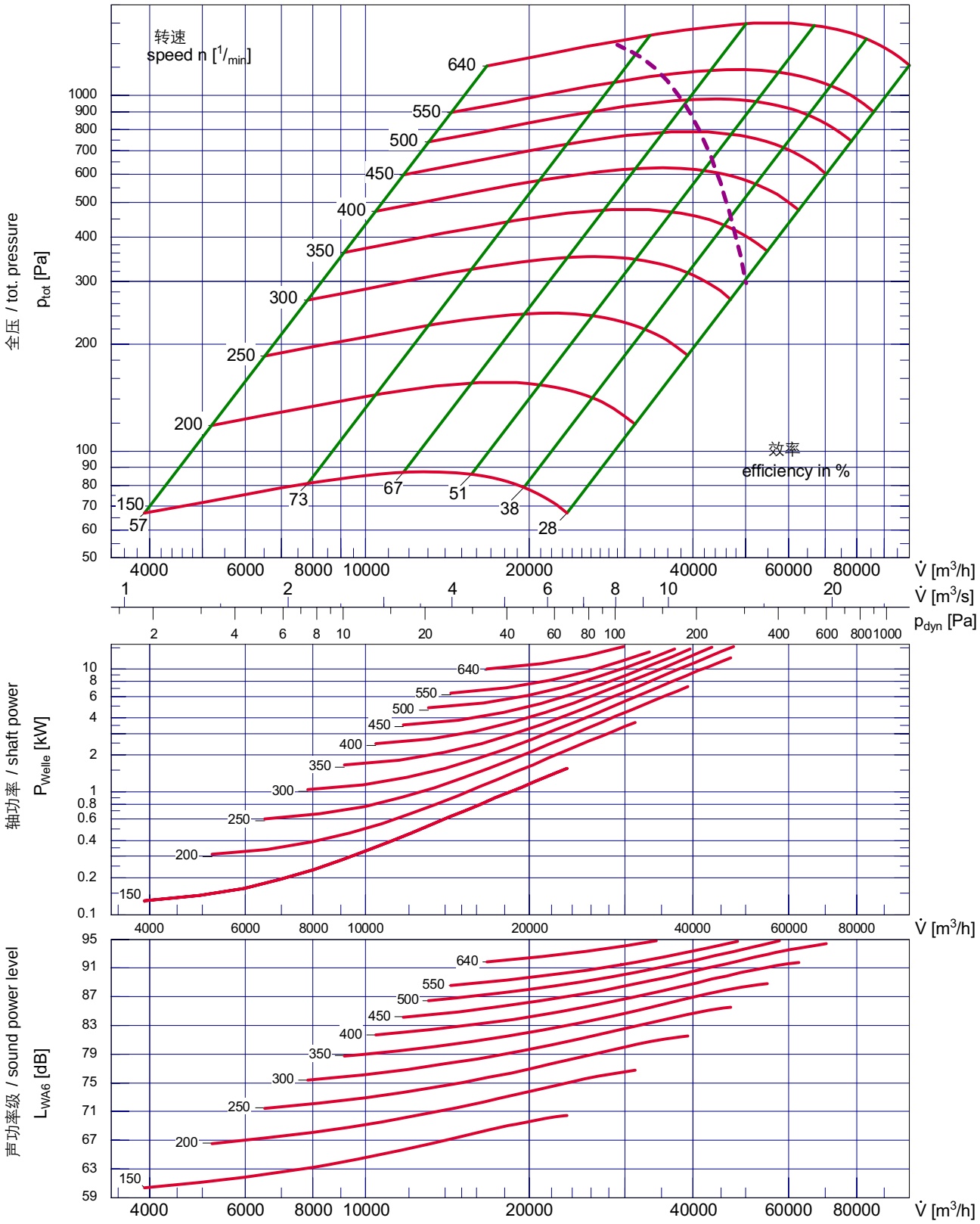
最高转速 / max. speed	950 $^1/_{min}$
消防型最高转速 / max. speed ex	750 $^1/_{min}$



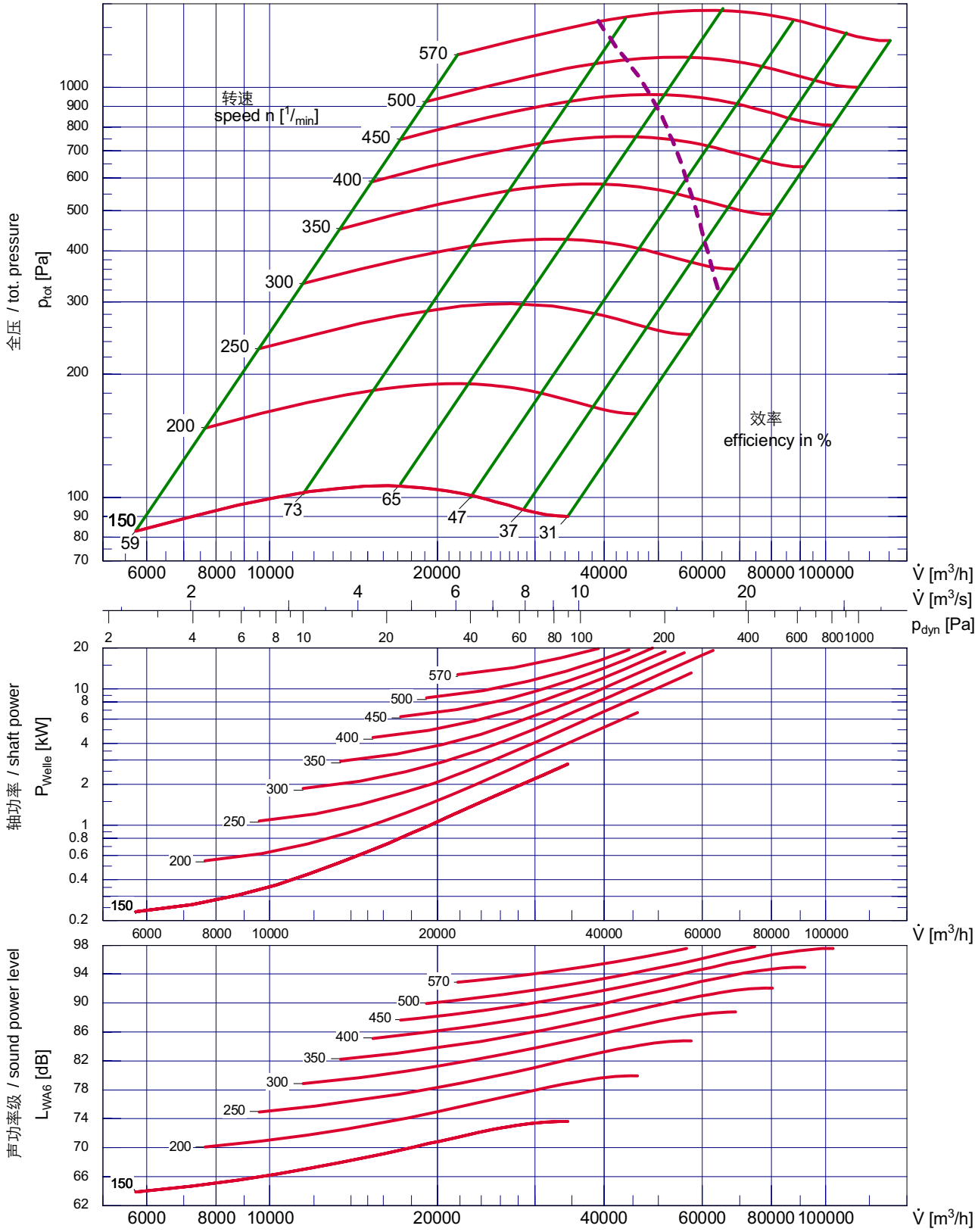
最高转速 / max. speed	840 $^{1}/_{min}$
消防型最高转速 / max. speed ex	650 $^{1}/_{min}$



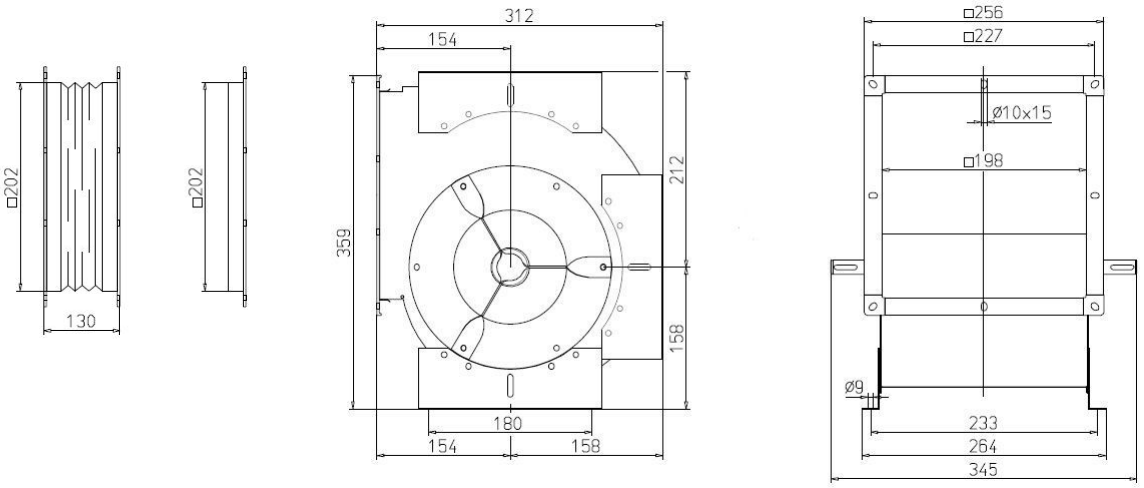
最高转速 / max. speed	740 $^1/_{min}$
消防型最高转速 / max. speed ex	600 $^1/_{min}$



最高转速 / max. speed	640 $^{1}/_{min}$
消防型最高转速 / max. speed ex	500 $^{1}/_{min}$

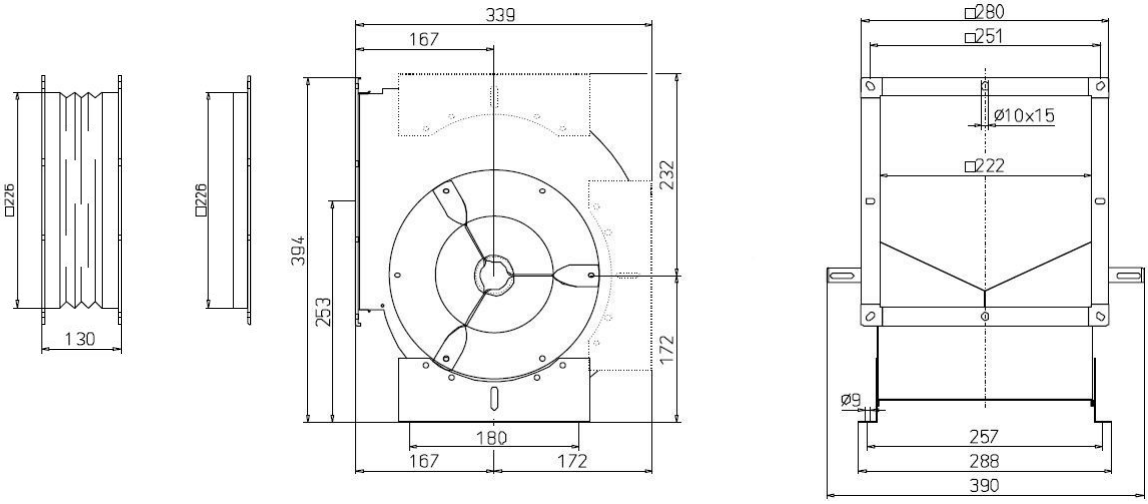


最高转速 / max. speed	570 $^{1}/_{min}$
消防型最高转速 / max. speed ex	450 $^{1}/_{min}$

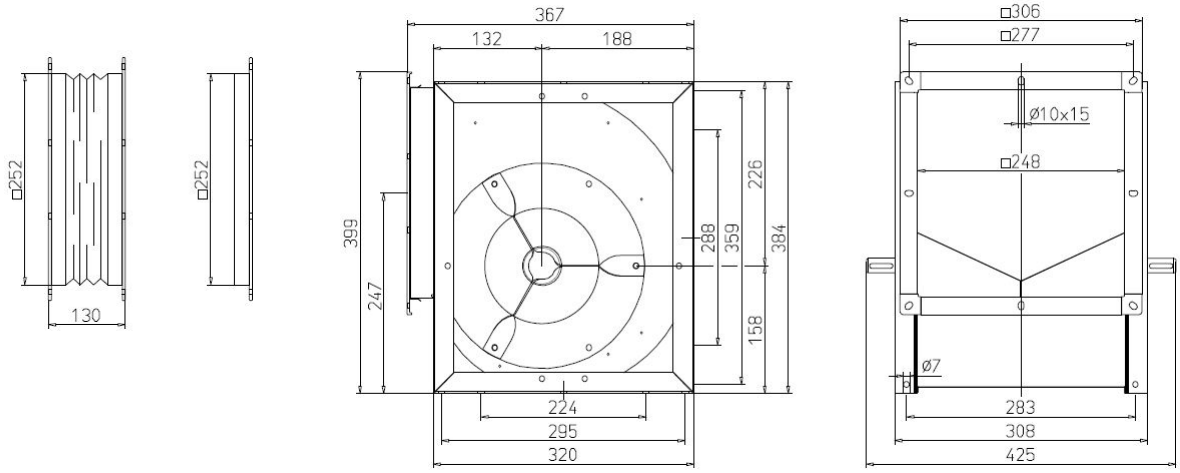


Total weight TRZ 160 8 kg

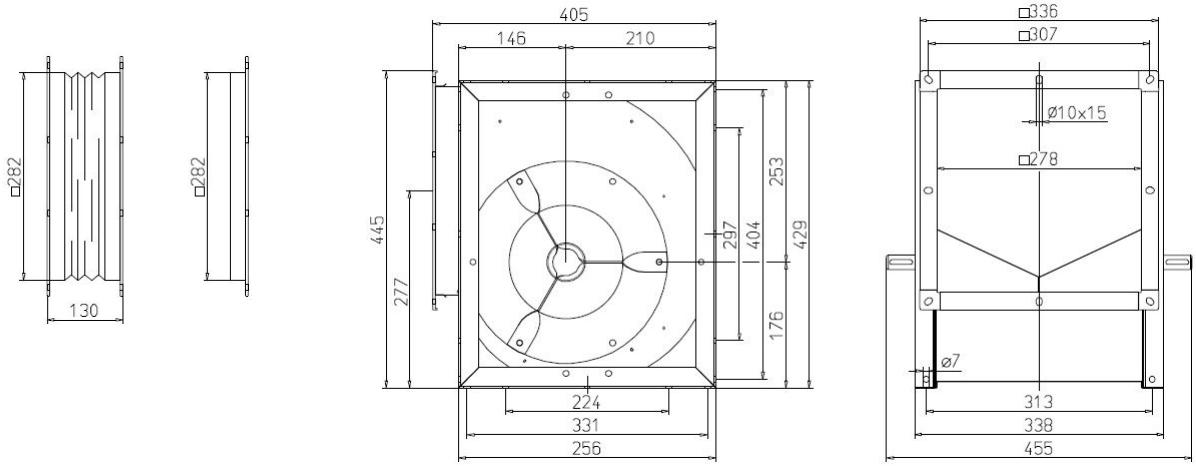
TRZ 160总重量



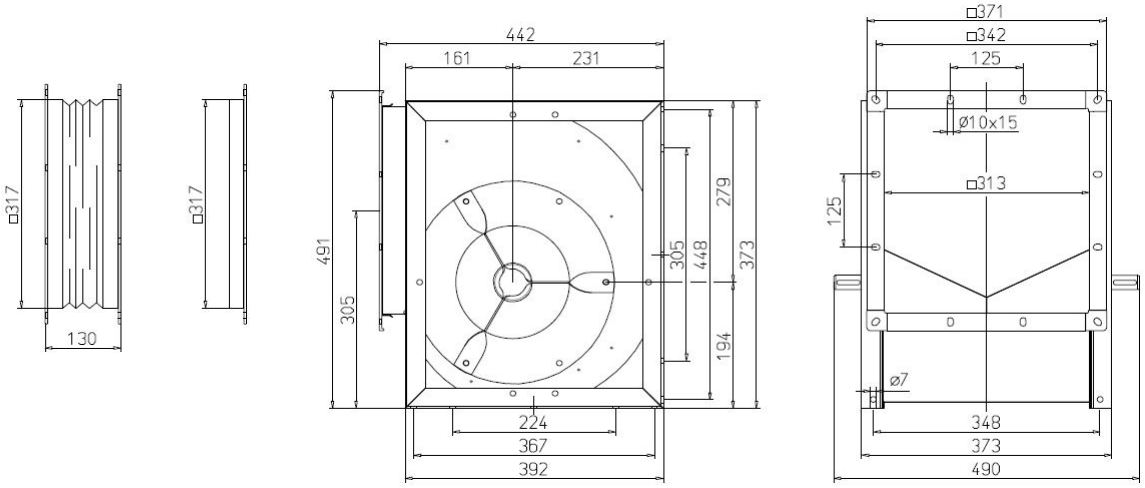
Total weight HRZ 180 8 kg
HRZ 180总重量
Total weight TRZ 180 10 kg
TRZ 180总重量



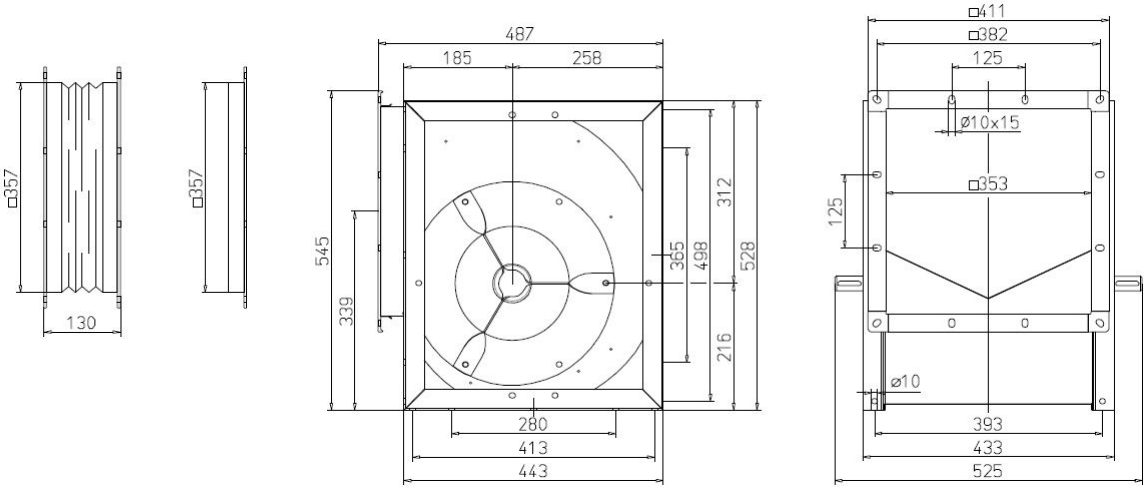
Total weight HRZ 200 HRZ 200总重量	12 kg
Total weight TRZ 200 TRZ 200总重量	14 kg



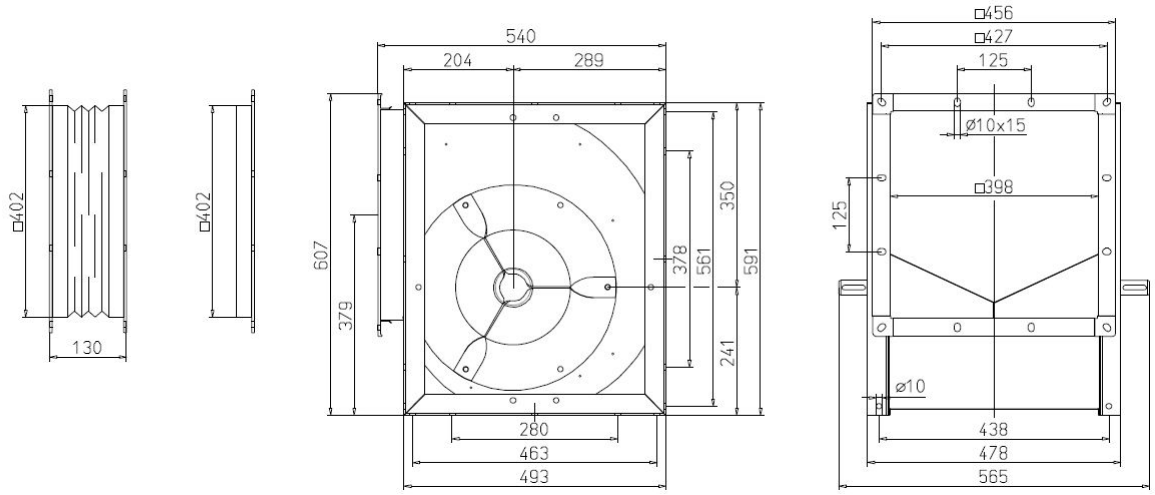
Total weight HRZ 225 HRZ 225总重量	15 kg
Total weight TRZ 225 TRZ 225总重量	17 kg



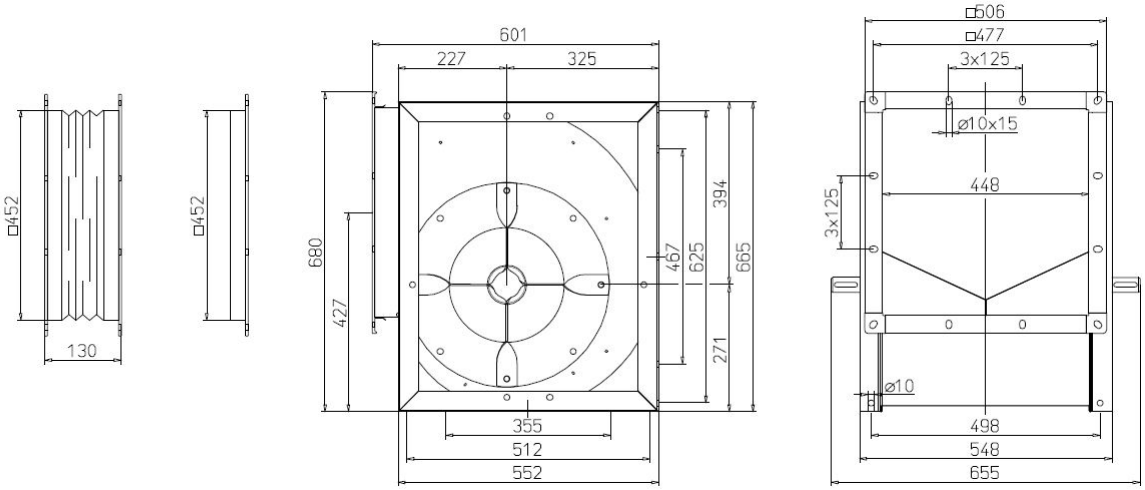
Total weight HRZ 250 HRZ 250总重量	17 kg
Total weight TRZ 250 TRZ 250总重量	19 kg



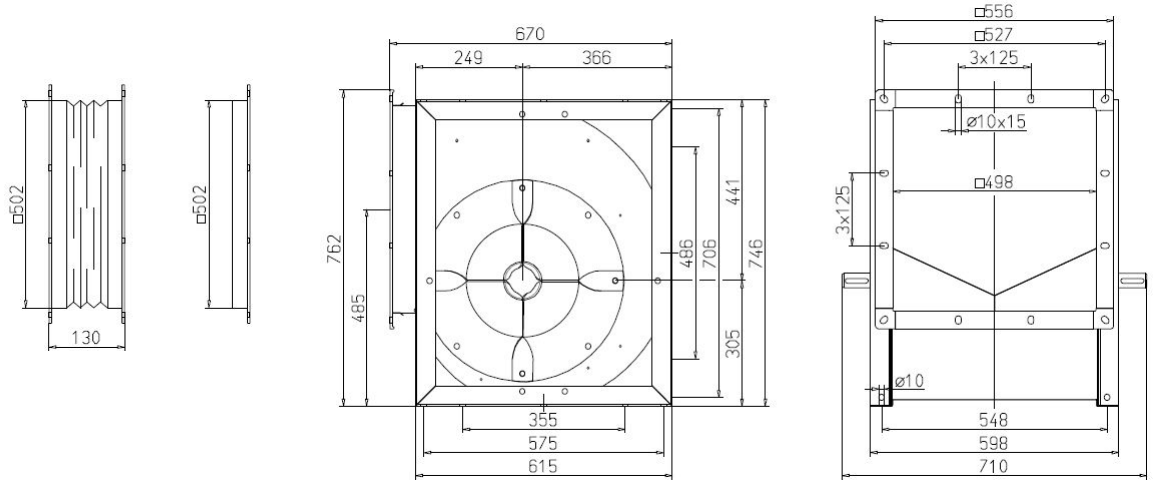
Total weight HRZ 280 HRZ 280总重量	22 kg
Total weight TRZ 280 TRZ 280总重量	24 kg



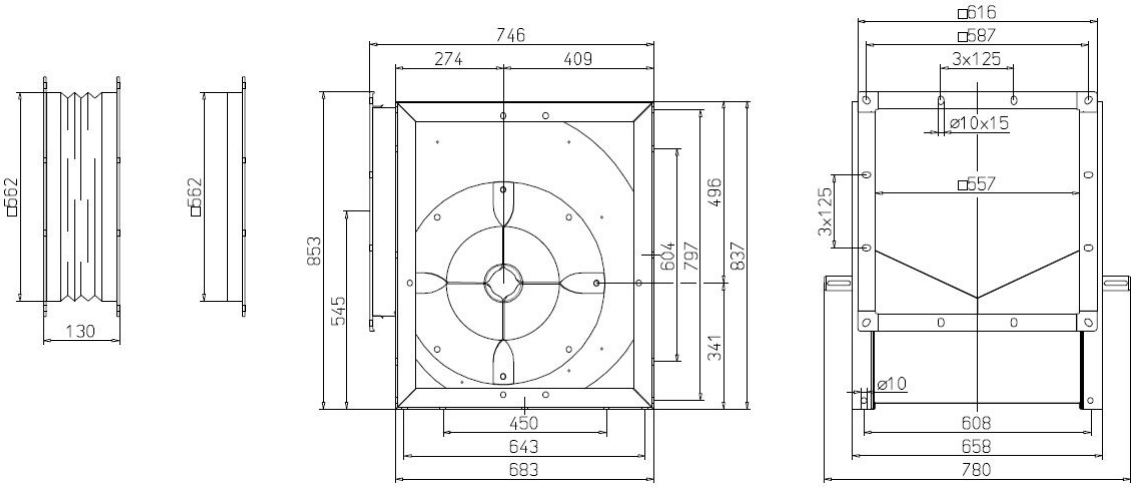
Total weight HRZ 315 HRZ 315总重量	27 kg
Total weight TRZ 315 TRZ 315总重量	29 kg



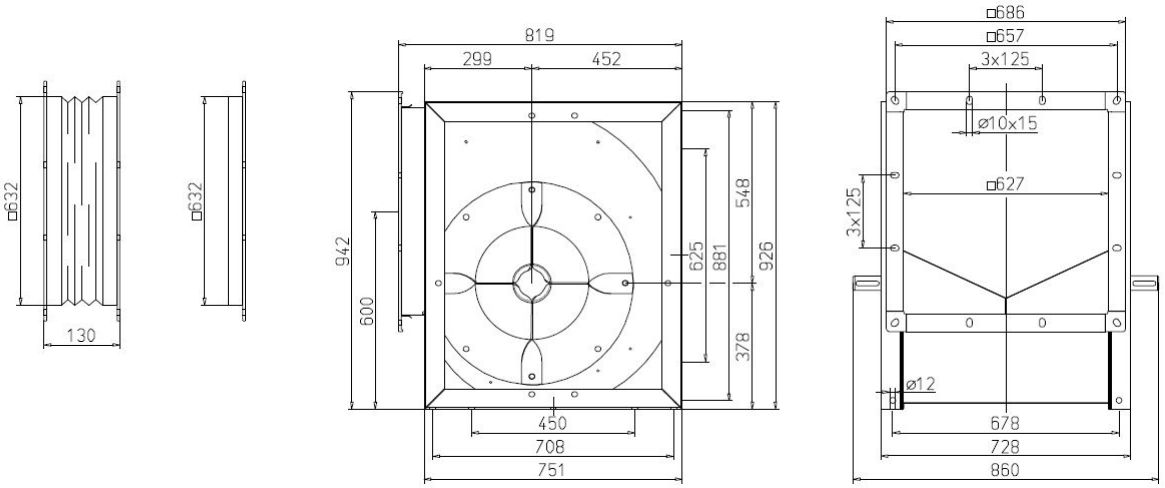
Total weight HRZ 355 HRZ 355总重量	41 kg
Total weight TRZ 355 TRZ 355总重量	43 kg



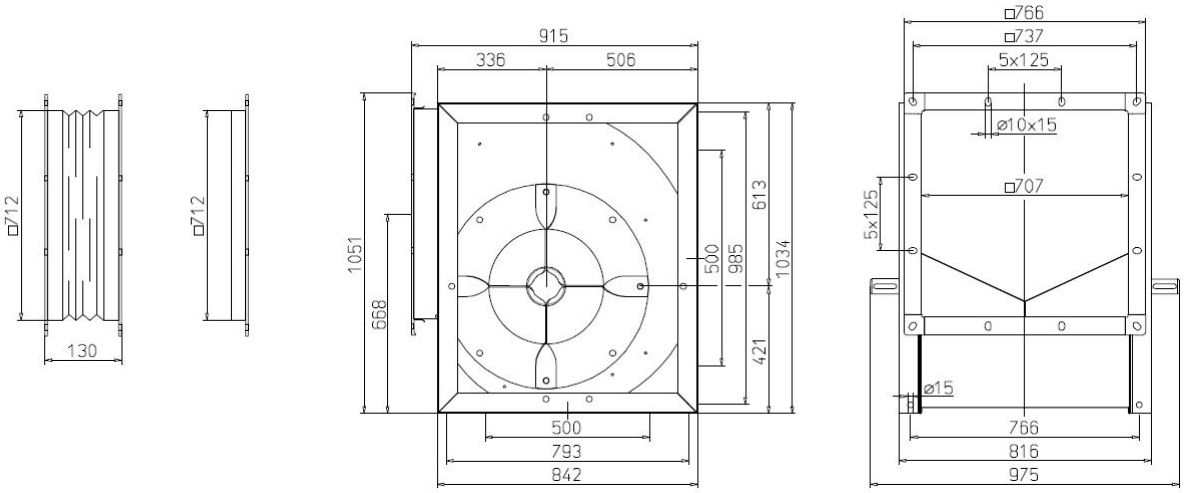
Total weight HRZ 400 HRZ 400总重量	57 kg
Total weight TRZ 400 TRZ 400总重量	60 kg



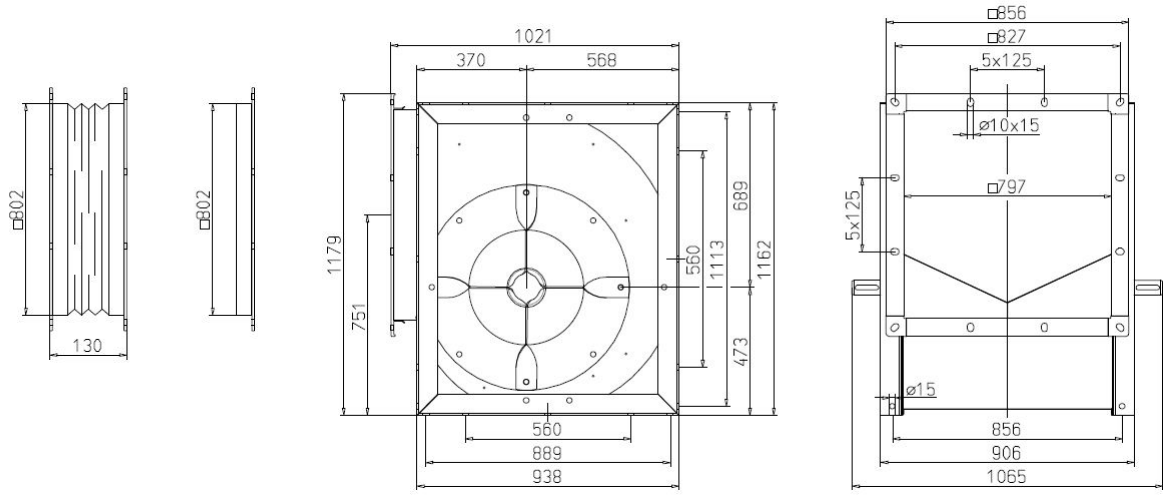
Total weight HRZ 450 HRZ 450总重量	66 kg
Total weight TRZ 450 TRZ 450总重量	69 kg



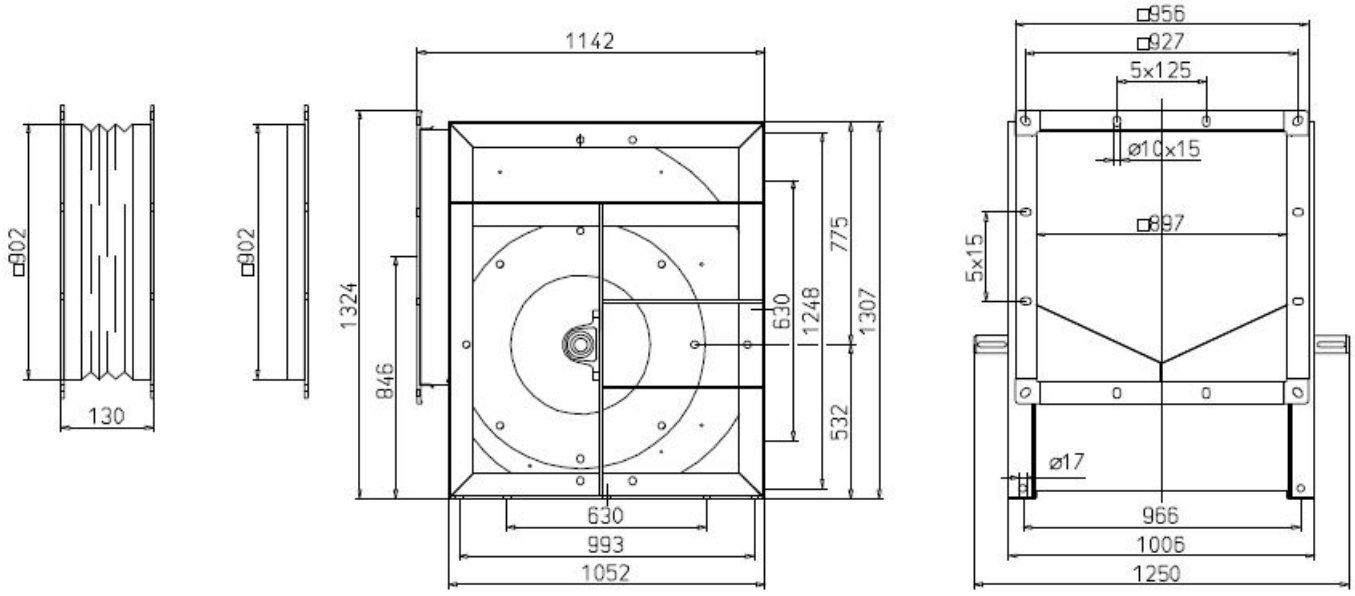
Total weight HRZ 500 HRZ 500总重量	84 kg
Total weight TRZ 500 TRZ 500总重量	87 kg



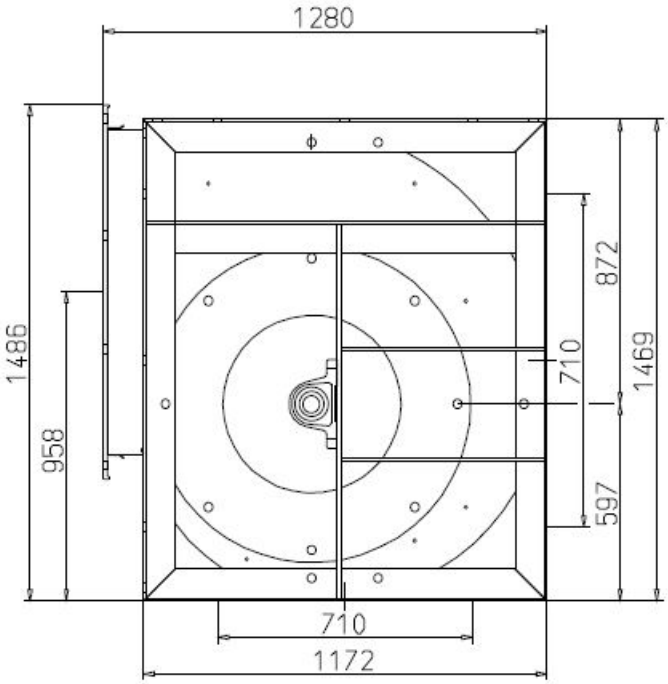
Total weight HRZ 560 HRZ 560总重量	106 kg
Total weight TRZ 560 TRZ 560总重量	111 kg

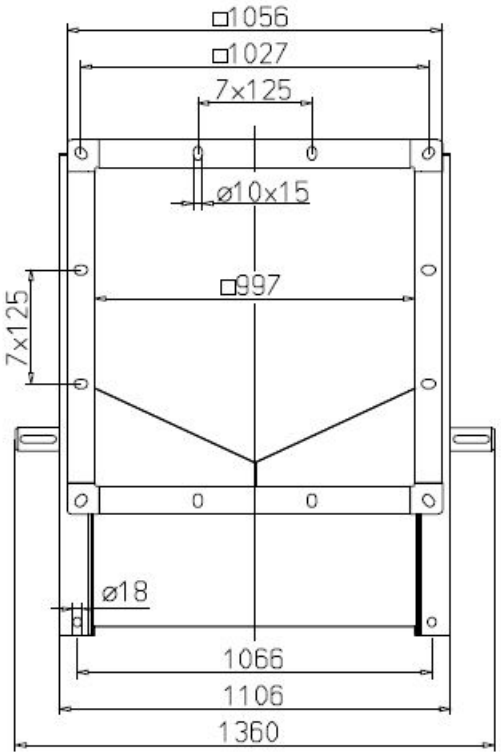


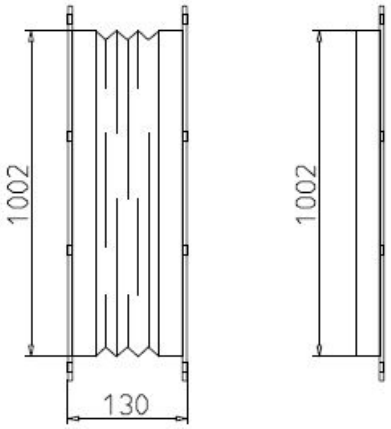
Total weight HRZ 630 HRZ 630总重量	133 kg
Total weight TRZ 630 TRZ 630总重量	137 kg



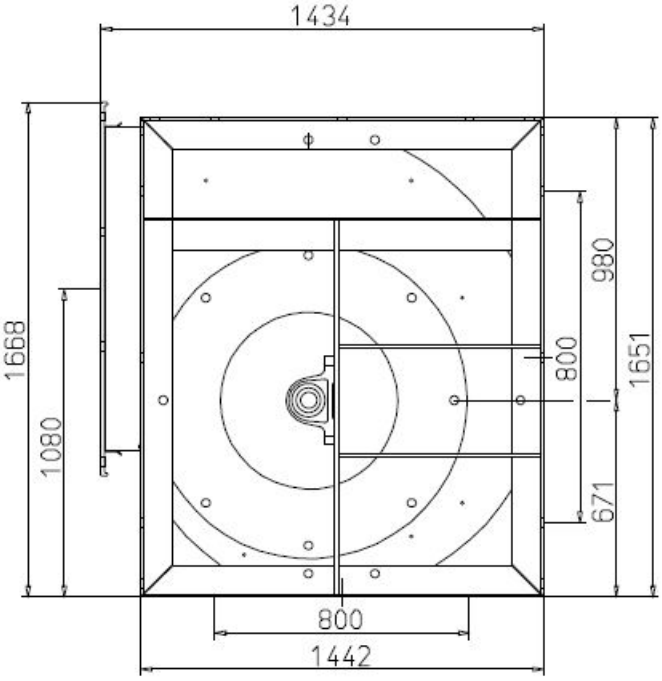
Total weight HRZ 710 HRZ 710总重量	201 kg
Total weight TRZ 710 TRZ 710总重量	206 kg

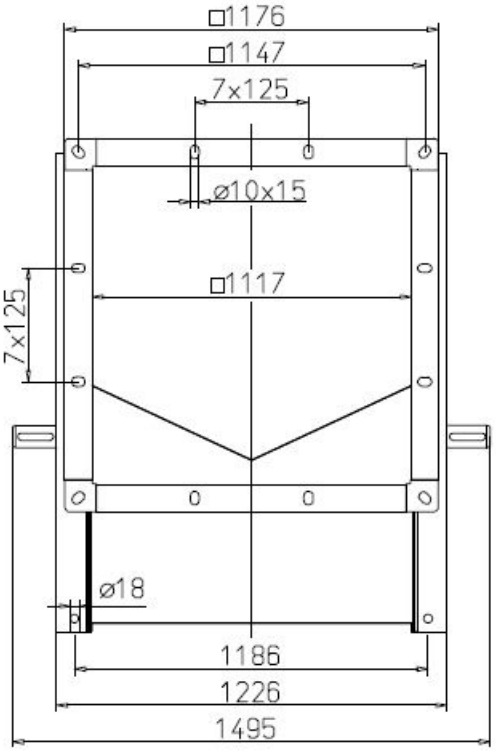


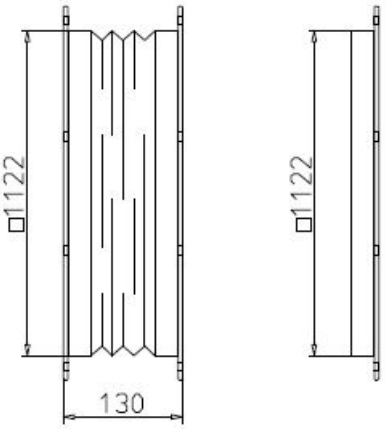




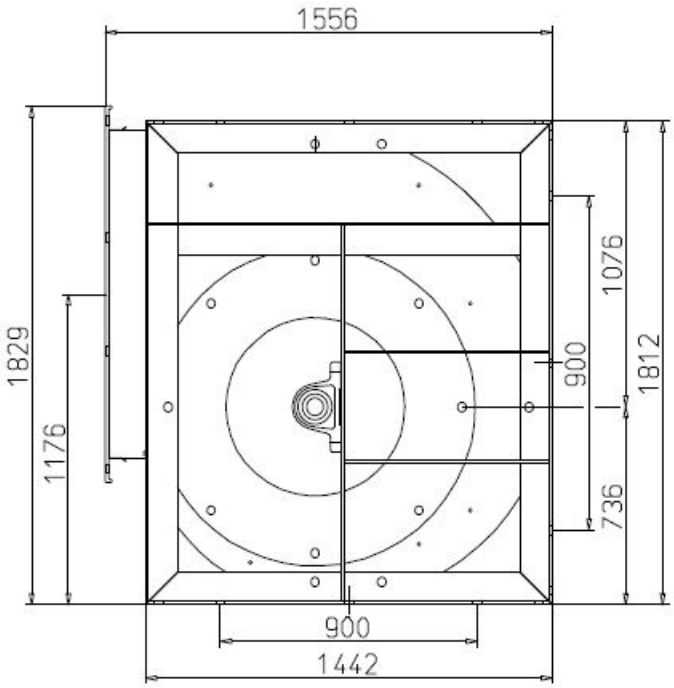
Total weight TRZ 800 TRZ 800总重量	257 kg

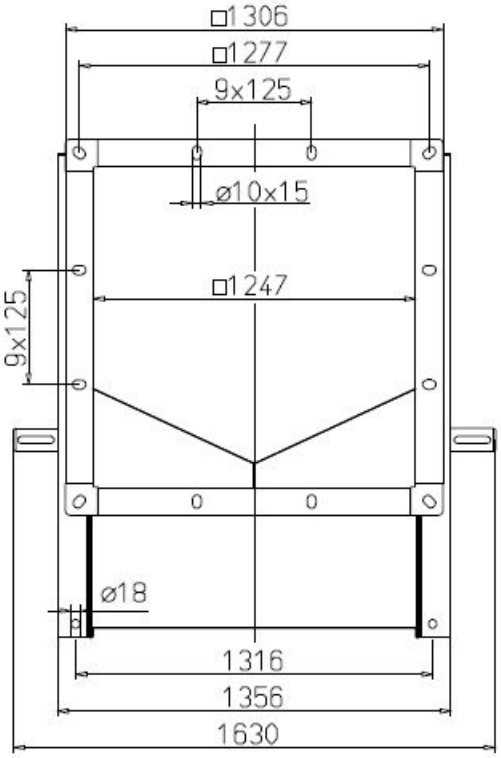


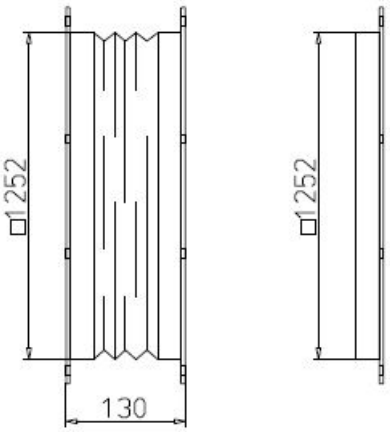




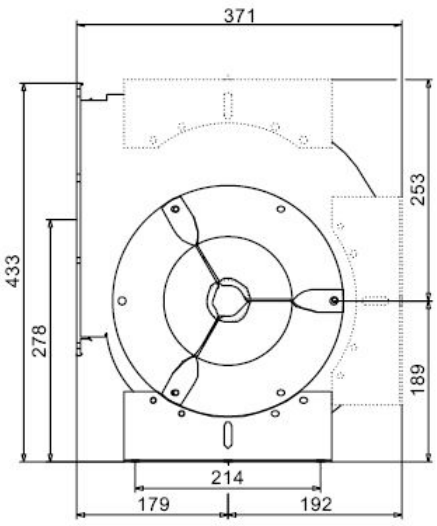
Total weight TRZ 900 TRZ 900总重量	308 kg

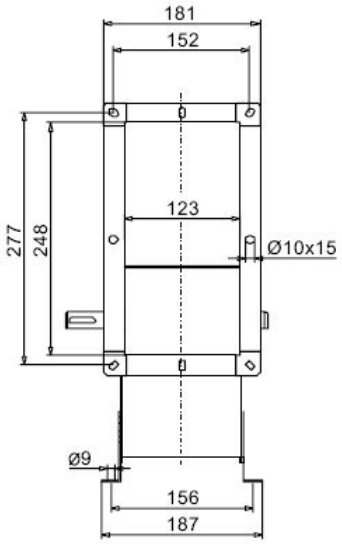


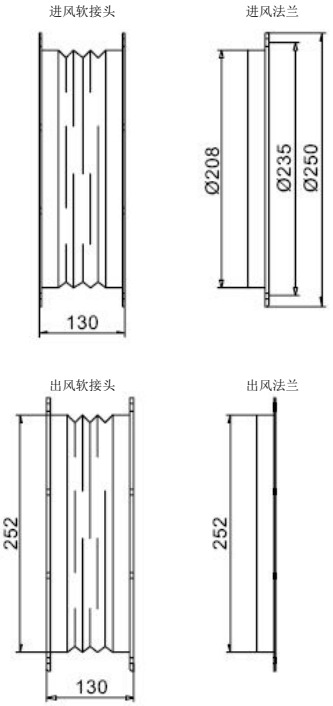




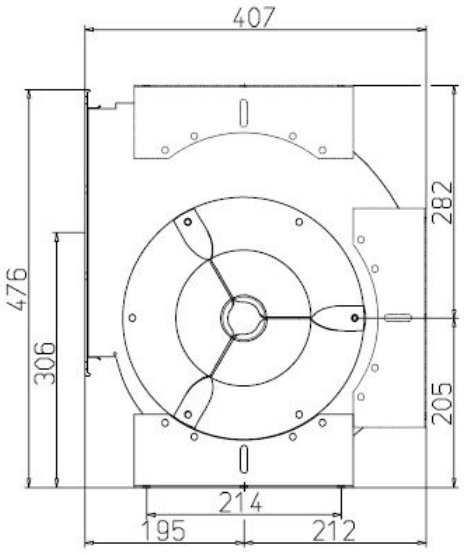
Total weight TRZ 1000 TRZ 1000总重量	396 kg

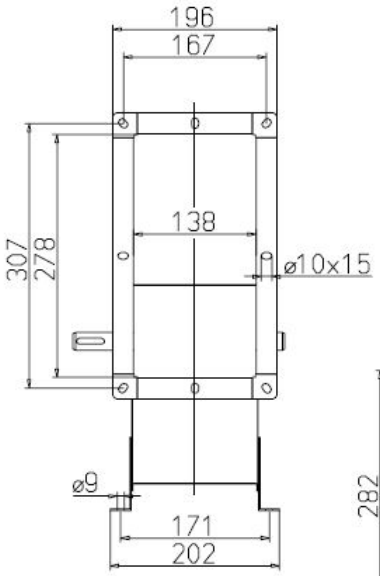


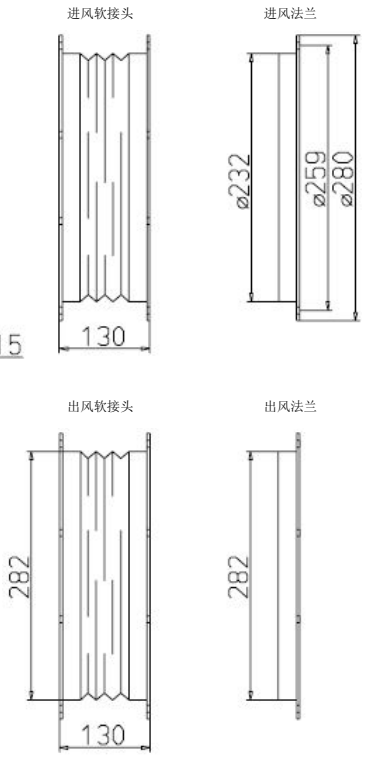




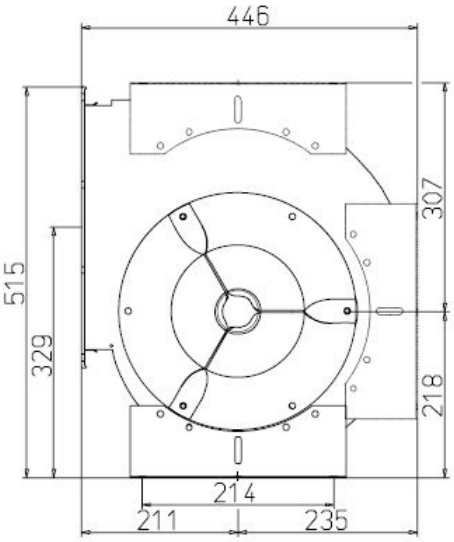
Total weight HRE 200 9 kg
HRE 200总重量
Total weight TRE 200 11 kg
TRE 200总重量

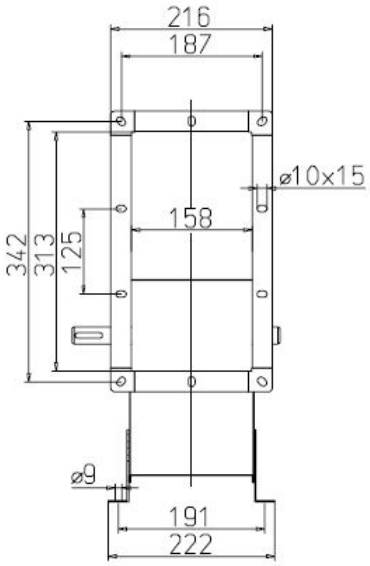


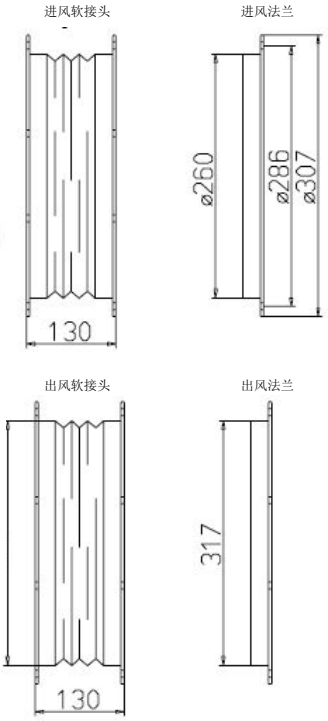




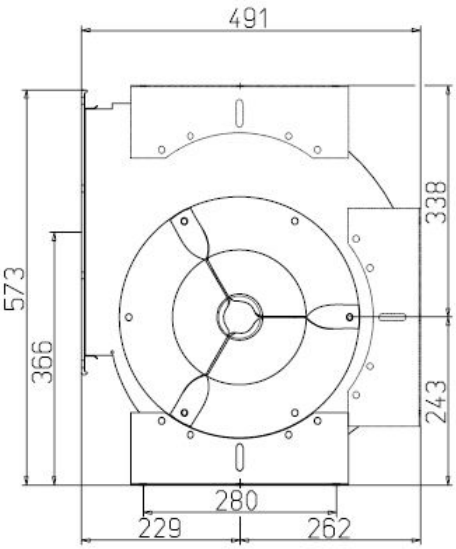
Total weight HRE 225 11 kg
HRE 225总重量
Total weight TRE 225 12 kg
TRE 225总重量

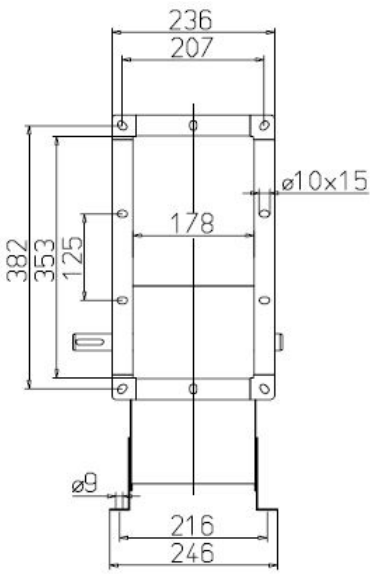


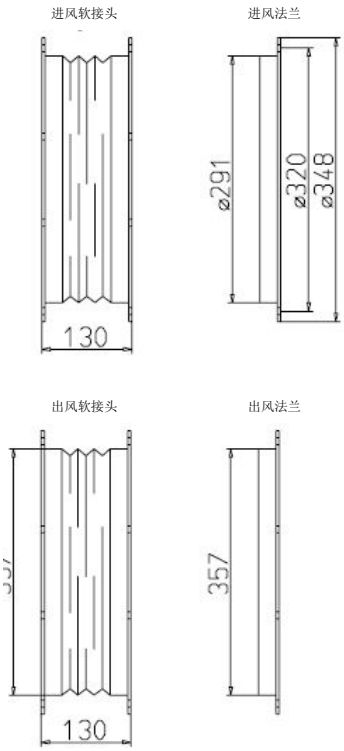




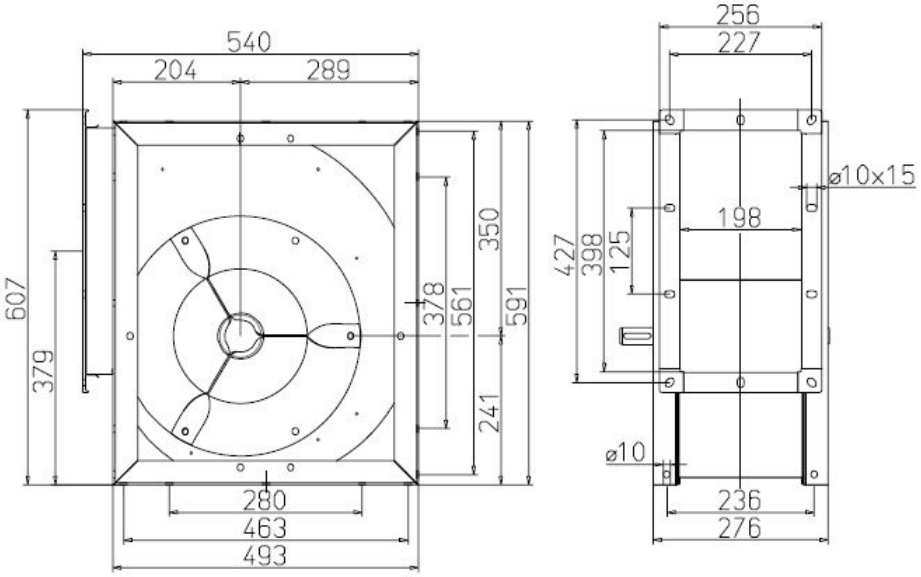
Total weight HRE 250 13 kg
HRE 250总重量
Total weight TRE 250 14 kg
TRE 250总重量

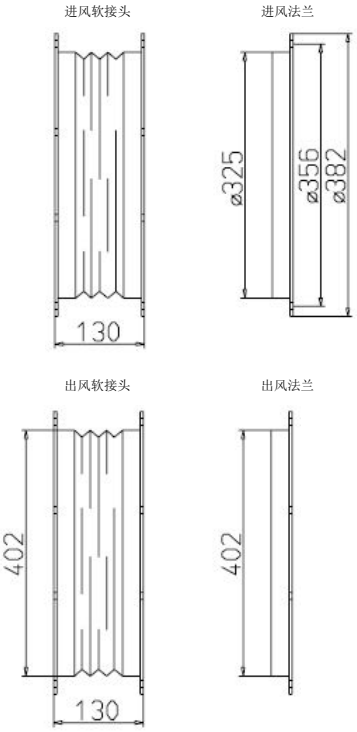




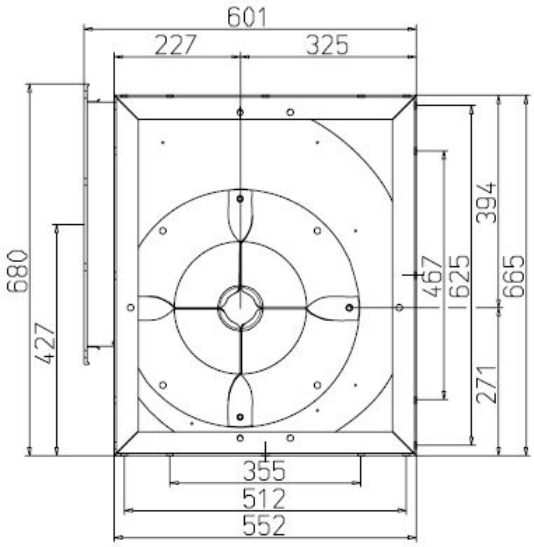


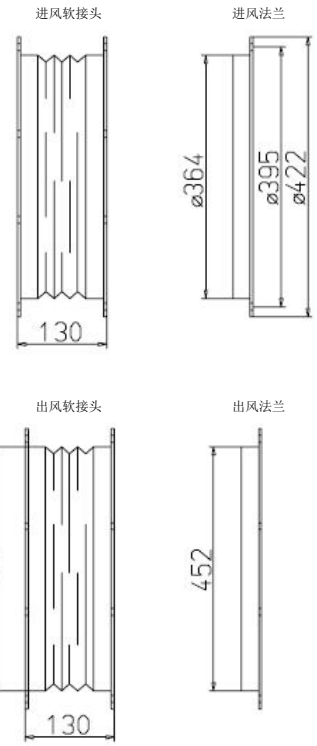
Total weight HRE 280 16 kg
HRE 280总重量
Total weight TRE 280 18 kg
TRE 280总重量



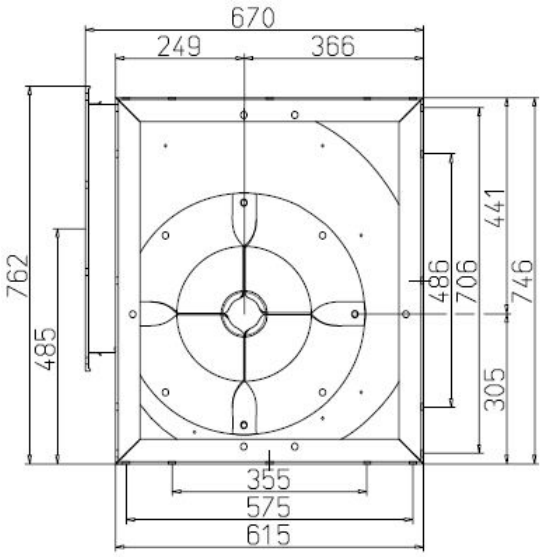


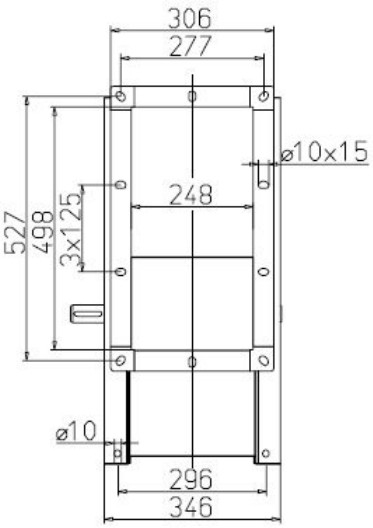
Total weight HRE 315 20 kg
HRE 315总重量
Total weight TRE 315 21 kg
TRE 315总重量

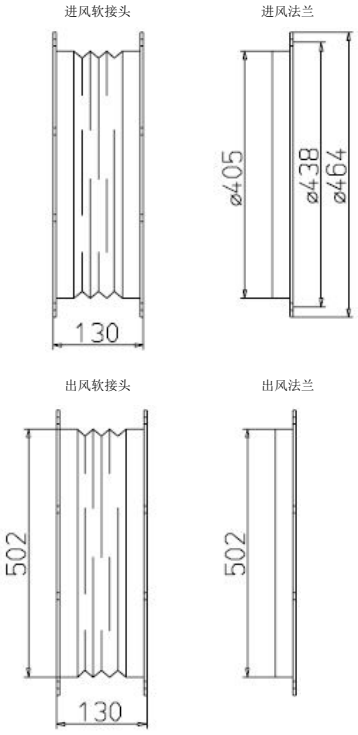




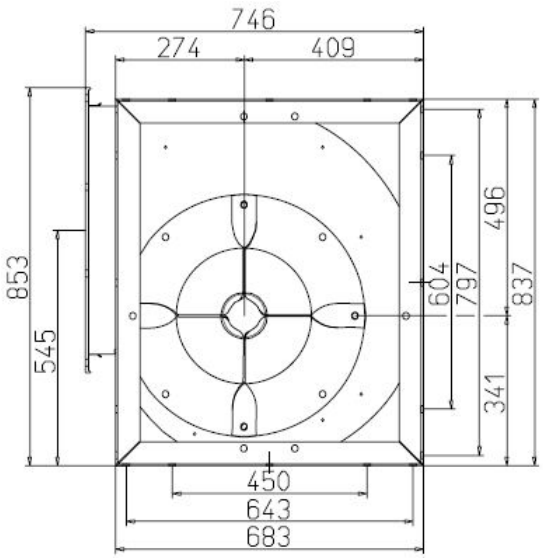
Total weight HRE 355 32 kg
HRE 355总重量
Total weight TRE 355 34 kg
TRE 355总重量

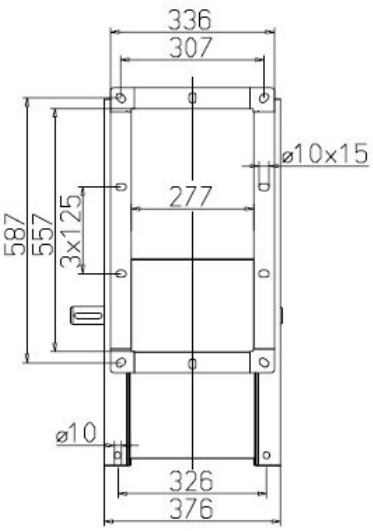


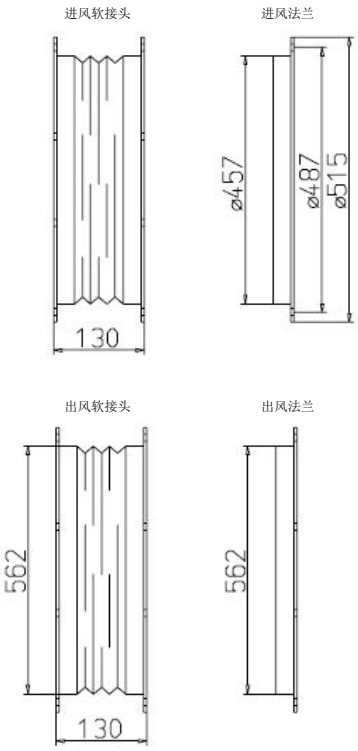




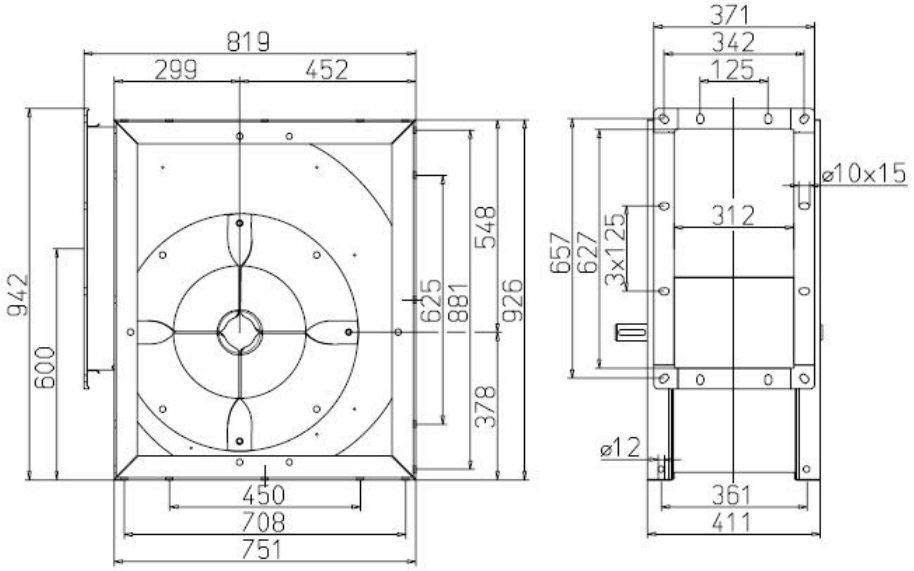
Total weight HRE 400 44 kg
HRE 400总重量
Total weight TRE 400 46 kg
TRE 400总重量

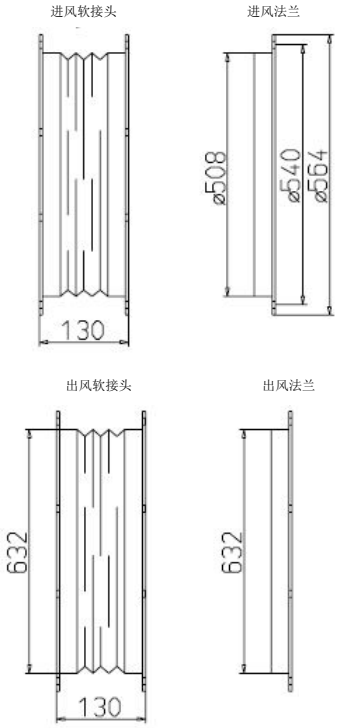




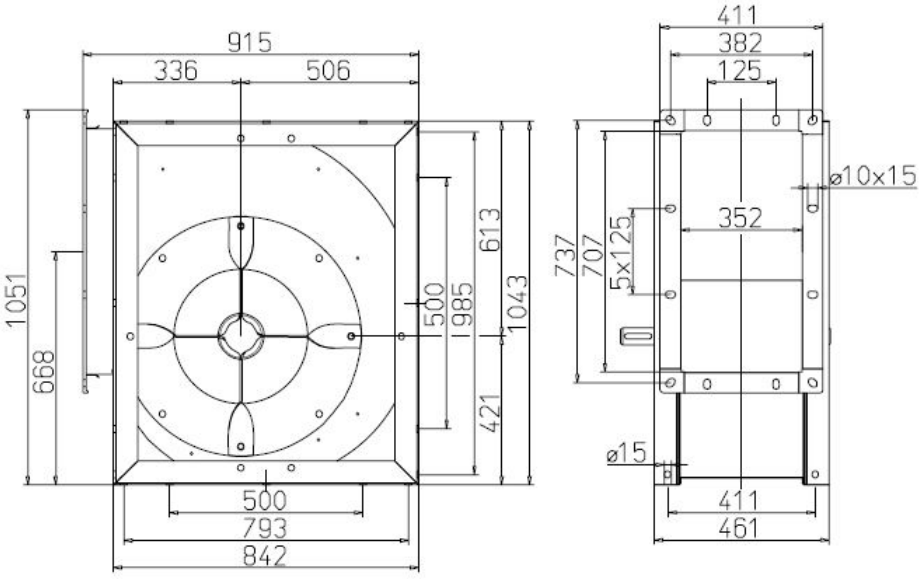


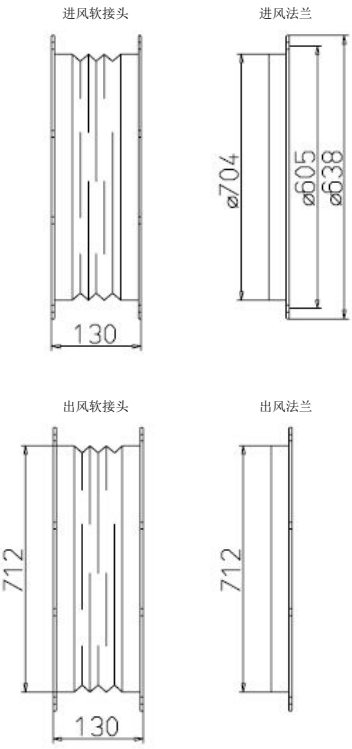
Total weight HRE 450 49 kg
HRE 450总重量
Total weight TRE 450 52 kg
TRE 450总重量



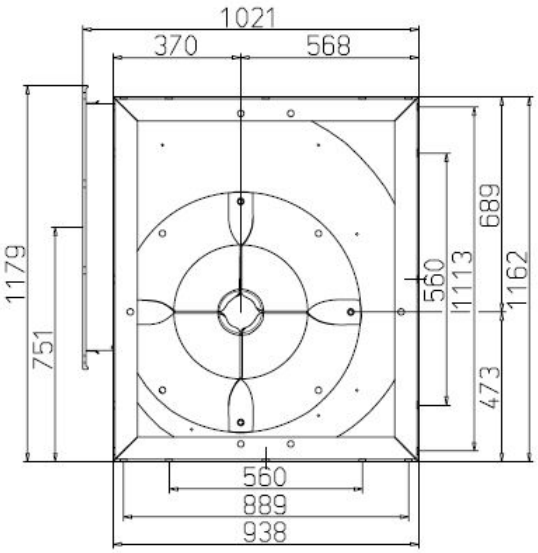


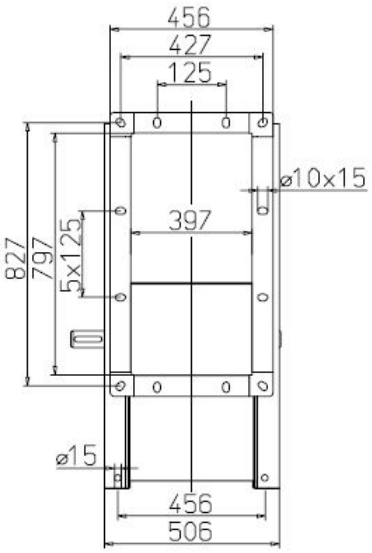
Total weight HRE 500 62 kg
HRE 500总重量
Total weight TRE 500 65 kg
TRE 500总重量

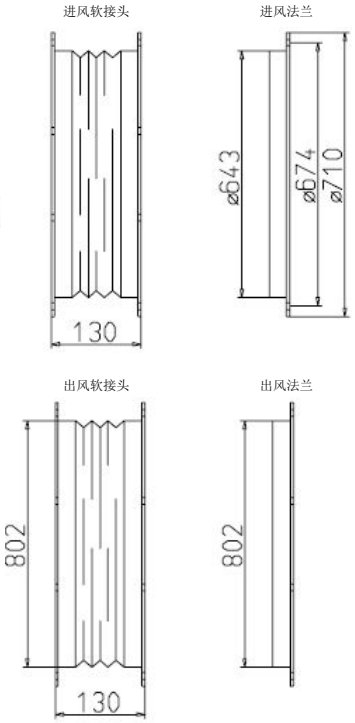




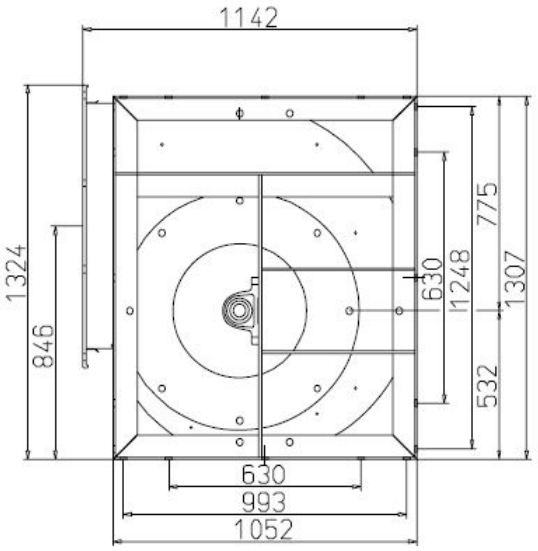
Total weight HRE 560 78 kg
HRE 560总重量
Total weight TRE 560 83 kg
TRE 560总重量

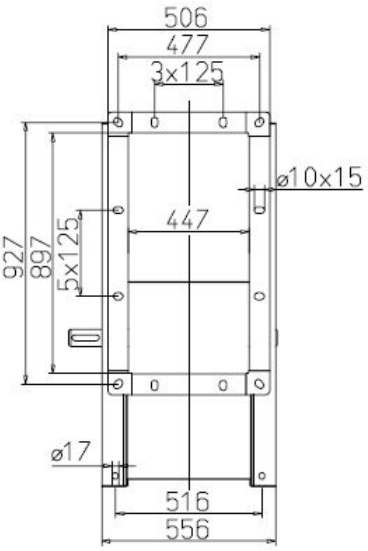


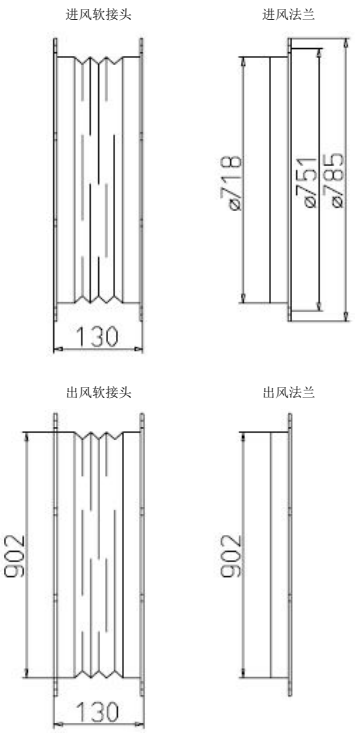




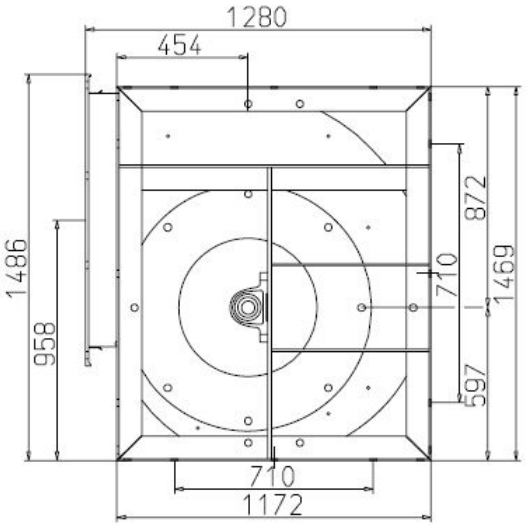
Total weight HRE 630 HRE 630总重量	97 kg
Total weight TRE 630 TRE 630总重量	112 kg

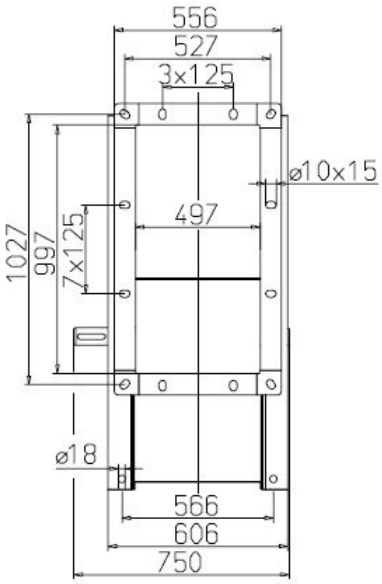


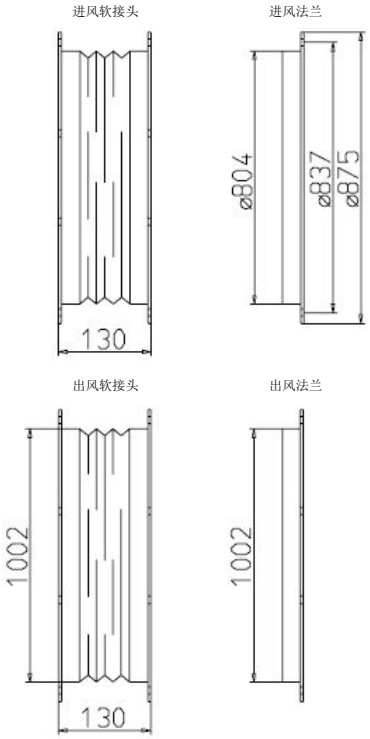




Total weight HRE 710 HRE 710总重量	78 kg
Total weight TRE 710 TRE 710总重量	83 kg

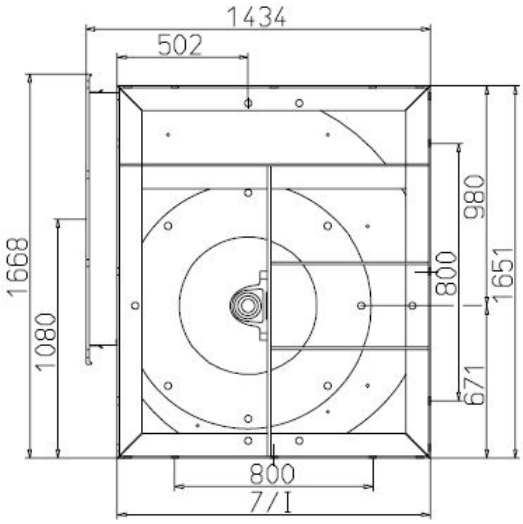


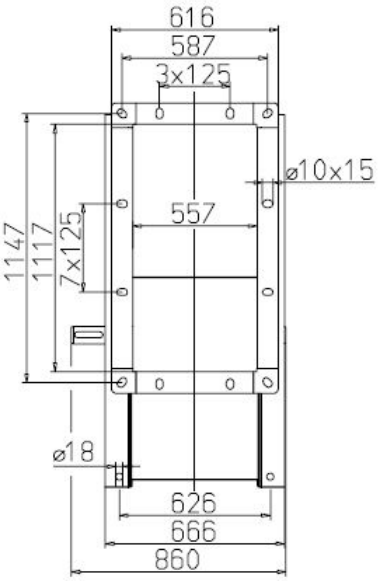


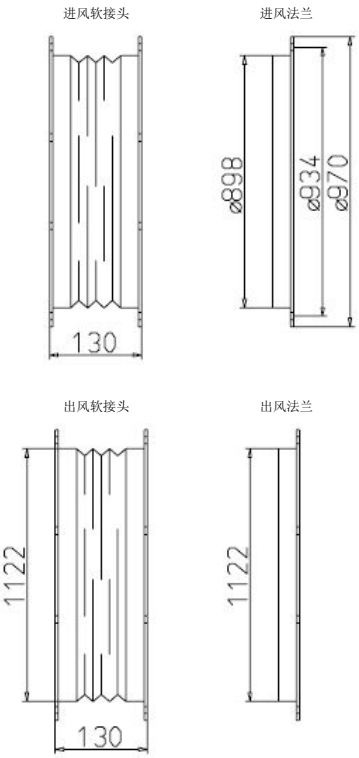


Total weight TRE 800
TRE 800总重量

172 kg

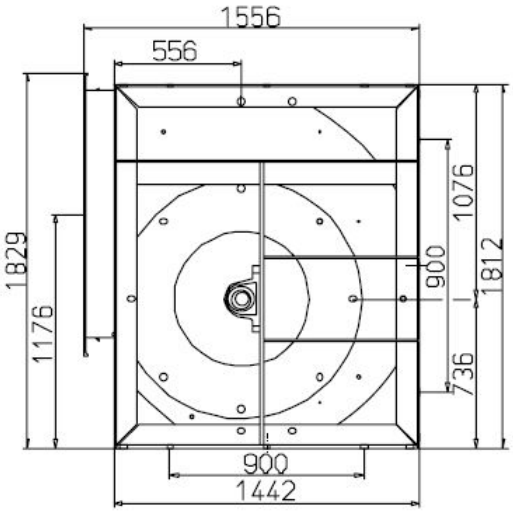


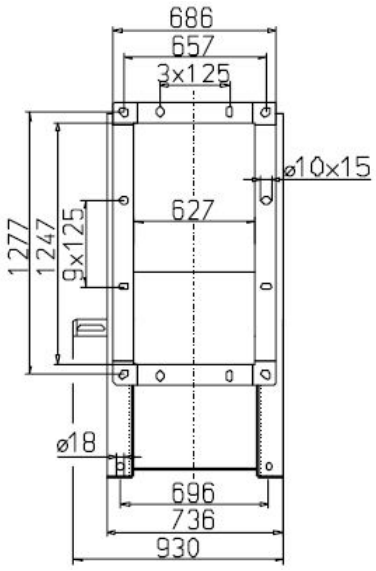


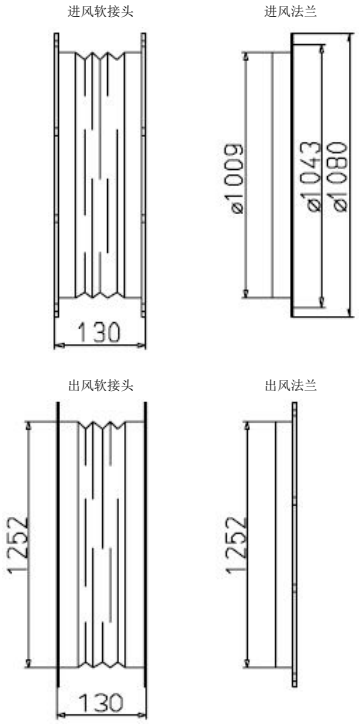


Total weight TRE 900
TRE 900总重量

205 kg





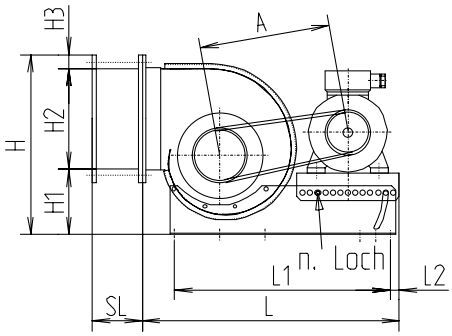


Total weight TRE 1000 267 kg
TRE 1000总重量

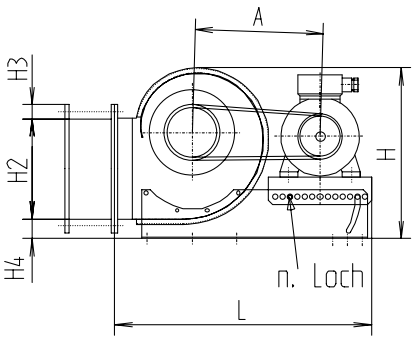
带摇臂底座的电机驱动结构，至尺寸315

Construction with motor-driven rocker dolly switch up to size 315

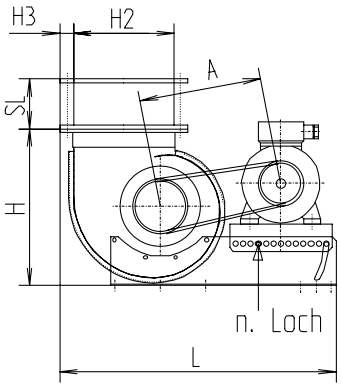
gezeichnet LG 90 (RD 90 spiegelbildlich)



RD 270 (LG 270)



RD 0 (LG 0)



蜗壳方向 direction of scroll		H	H1	H2	H3	H4	L	L1	L2	SL	A_{min} ①	n. ②	电机尺寸 motor size
160	LG 90	359	131	200	28		511	430	17	130	260	3.	71 - 90
	RD 270	341		200	28	39	511	430	17	130	255	3.	
	RD 0	312		200	28		551	430	17	130	250	4.	
180	LG 90	394	142	224	28		540	430	31	130	275	2.	71 - 100
	RD 270	377		224	28	38	540	430	31	130	270	2.	
	RD 0	339		224	28		540	430	31	130	260	3.	
200	LG 90	433	155	250	28		600	497	31	130	310	4.	71 - 112
	RD 270	410		250	28	37	600	497	31	130	310	4.	
	RD 0	371		250	28		651	497	31	130	310	6.	
225	LG 90	476	168	280	28		631	497	46	130	325	3.	80 – 112
	RD 270	459		280	28	39	631	497	46	130	320	3.	
	RD 0	407		280	28		692	497	46	130	310	4.	
250	LG 90	515	172	315	28		662	497	61	130	340	2.	80 - 112
	RD 270	501		315	28	38	662	497	61	130	340	2.	
	RD 0	446		315	28		662	497	61	130	320	3.	
280	LG 90	573	190	355	28		737	615	32	130	360 (380)	5. (4.)	80 – 132 (132)
	RD 270	555		355	28	36	737	615	32	130	380	5. (4.)	
	RD 0	491		355	28		823	615	32	130	335	6.	
315	LG 90	635	207	400	28		773	615	47	130	395 (410)	3. (2.)	80 – 132 (132)
	RD 270	618		400	28	38	773	615	47	130	420	3. (2.)	
	RD 0	541		400	28		859	615	47	130	365	5.	

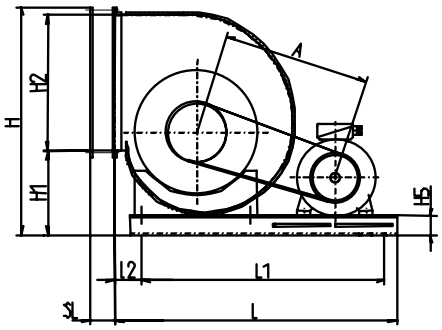
① A_{min} 最小中心距 / center distance minimum

② n. 电机摇臂底座中轴 / pivot of motor-driven rocker dolly switch

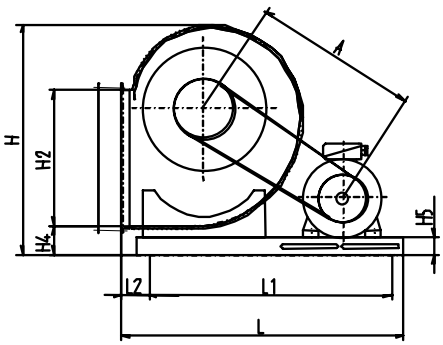
电机滑轨结构，电机尺寸从 355至630

Construction with motor slide size 355 – 630

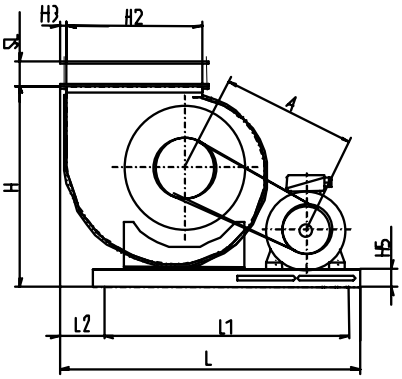
gezeichnet LG 90 (RD90 spiegelbildlich)



RD 270 (LG 270)



RD 0 (LG 0)

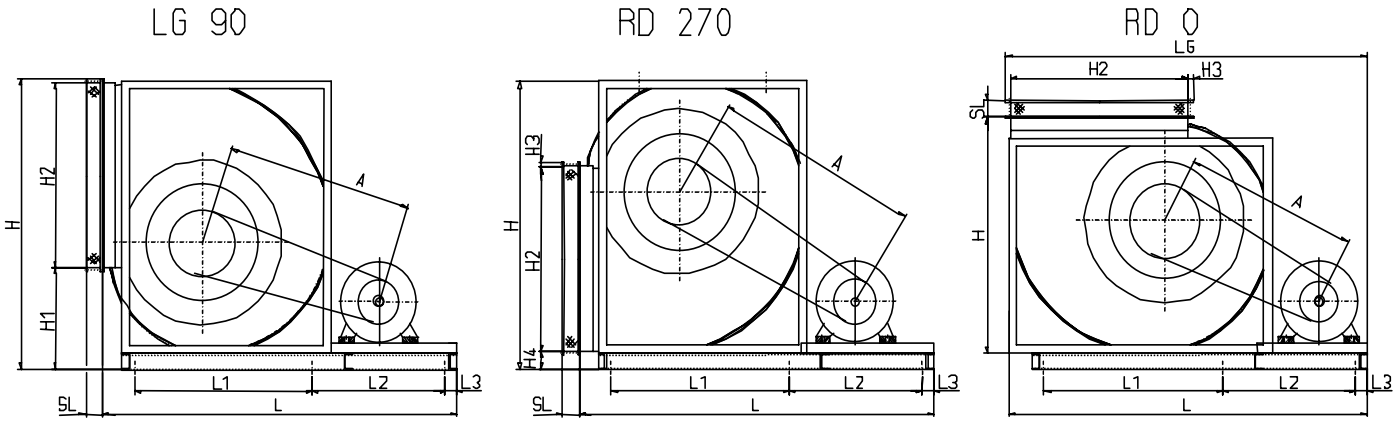


蜗壳方向 direction of scroll		H	H1	H2	H3	H4	H5	L	L1	L2	SL	A_{min} ①	电机尺寸 Motor size
355	LG 90	767	289	450	28		75	1026	940	56	130	535	90 - 160
	RD 270	770		450	28	110	75	1026	940	56	130	555	
	RD 0	678		450	28		75	1060	940	91	130	453	
400	LG 90	843	315	500	28		75	1056	940	86	130	543	90 - 160
	RD 270	845		500	28	113	75	1056	940	86	130	606	
	RD 0	747		500	28		75	1109	940	139	130	489	
450	LG 90	934	346	560	28		75	1162	1040	92	130	601	100 - 160
	RD 270	948		560	28	118	75	1162	1040	92	130	679	
	RD 0	827		560	28		75	1238	1040	168	130	562	
500	LG 90	1026	368	630	28		75	1192	1040	122	130	639	100 - 160
	RD 270	1030		630	28	115	75	1192	1040	122	130	705	
	RD 0	900		630	28		75	1291	1040	221	130	580	
560	LG 90	1130	392	710	28		75	1294	1140	124	130	724	112 - 180
	RD 270	1140		710	28	114	75	1294	1140	124	130	781	
	RD 0	994		710	28		75	1346	1140	176	130	638	
630	LG 90	1254	426	800	28		75	1533	1450	33	130	868	132 - 180
	RD 270	1237		800	28	86	75	1533	1450	33	130	963	
	RD 0	1096		800	28		75	1687	1450	205	130	820	

① A_{min} 最小中心距 / center distance minimum

带焊接底座结构，尺寸从630至1000

Construction with welded base frame size 630 – 1000

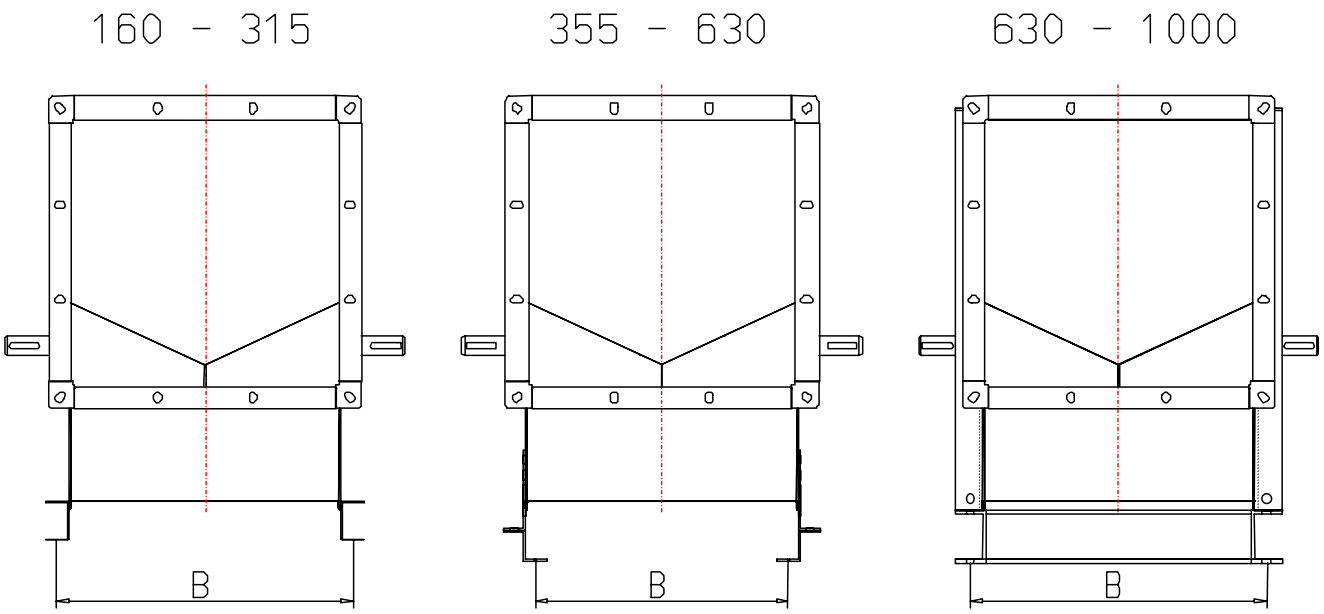


蜗壳方向 direction of scroll		H	H1	H2	H3	H4	H5	L	L1	L2	L3	LG	SL	A_{min} ①	电机尺寸 Motor size
630	LG 90	1259	431	800	28		80	1552	1350		75		130	820	112 – 225
	RD 270	1259		800	28	63	80	1552	1350		75		130	900	
	RD 0	1101		800	28		80	1701	1350		75	1718	130	760	
710	LG 90	1404	476	900	28		80	1801	920	630	75		130	910	112 – 225
	RD 270	1404		900	28	63	80	1801	920	630	75		130	1020	
	RD 0	1222		900	28		80	1949	920	630	75	1966	130	860	
800	LG 90	1566	538	1000	28		80	1959	920	780	75		130	1030	112 – 250
	RD 270	1566		1000	28	63	80	1959	920	780	75		130	1130	
	RD 0	1360		1000	28		80	2080	920	780	75	2097	130	960	
900	LG 90	1768	620	1120	28		100	2230	1120	830	75		130	1160	112 – 250
	RD 270	1768		1120	28	83	100	2230	1120	830	75		130	1260	
	RD 0	1534		1120	28		100	2396	1120	830	75	2413	130	1090	
1000	LG 90	1929	651	1250	28		100	2365	1320	780	75		130	1280	132 - 250
	RD 270	1929		1250	28	83	100	2365	1320	780	75		130	1420	
	RD 0	1656		1250	28		100	2616	1320	780	75	2633	130	1200	

① A_{min} 最小中心距 / center distance minimum

Anschlussmaß für Ausführung mit:
Motorwippe (160 – 315)
Motorschlitten (355 – 630)
geschweißtem Grundrahmen (630 – 1000)

Connection dimensions for fan types with:
motor-driven rocker dolly switch (160 – 315),
motor slide (355 – 630)
welded base frame (630 – 1000)



	160	180	200	225	250	280	315
HRZ / TRZ	233	257	283	313	348	393	438
HRE / TRE			156	171	191	216	236

	355	400	450	500	560	630
HRZ / TRZ	498	548	608	678	766	856
HRE / TRE	270	296	326	361	411	456

	630	710	800	900	1000
HRZ / TRZ	856	966	1066	1186	1316
HRE / TRE	456	516	566	626	696

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