



HORUS AIR MOVING 和旭風機

RP 系列—後傾式離心風機（無蝸殼型式）

Series RP, Centrifugal Fan, with Backward Wheels (no fan casing type)

RP102, June 2020



Horus Air Moving Co. Ltd. certifies that the RP series fans shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.

All the Centrifugal Fans described herein are licensed to bear the AMCA Seal, and their certified ratings are shown on pages 6 through 14.

和旭機械股份有限公司特此證明，此處所示 RP 系列離心風機獲得了加蓋 AMCA 印章的授權。所示額定值系依據 AMCA 出版物 211 和 AMCA 出版物 311 所進行測試和程序確認，並符合 AMCA 認證額定值計劃的要求。

這裡描述的所有離心風機都已經取得了 AMCA 印章，它們的認證數據見第 6 到 14 頁。

概述

本公司之風機採用後傾式離心葉輪，具有通用性強、效率高、噪音低、耗能少等特點。是各類中央空調機組及其它暖氣空調、淨化、通風等最佳選擇。

產品結構

RP 系列風機主要由葉輪、入風口、入風口固定板、馬達架構成，風機底座為選配，常規配置不帶法蘭。

葉輪

葉輪採用優質鋼板製成，葉片設計符合空氣動力的特定形狀，使得效率最高、噪音最低。葉片用焊接固定在中盤板及葉輪蓋板上，葉輪蓋板採用油壓伸抽一體成型，在最大功率連續運轉時，葉輪具有足夠的剛度。葉輪依據 ISO1940-1 及 AMCA204 BV-4 的動平衡及振動要求，按 G2.5 等級全檢合格。不銹鋼或鋁合金葉輪亦可採用。

入風口

風機入風口採用優質鋼板加工製作，符合空氣動力學的流線型設計，採用拉伸成型，使得氣流更加穩定的進入葉輪，減小了損失提高了風機效率。風機入風口與葉輪的配合部分的間隙距離是依據空氣動力計算設計，有效提高風機性能穩定性。

Outline

The ventilators are centrifugal fans with backward curved impellers. Some of the features and characteristics of these ventilators are: backward impeller blading, a wide range of applications, high efficiency, low noise, and low power consumption. These ventilators are ideal for use in central air conditioning systems, heating and ventilating air conditioning systems, and in purifiers. They are also suitable for use in a number of other ventilator applications.

Construction of Product

RP-series Fans are mainly constructed of impeller, inlet cone, inlet cone positioning plate and motor bracket. Fan base frame is optional.

Impeller

The impeller is made of high grade steel sheet, and it is configured to provide a highly efficient and low noise aerodynamic flow path. The blade is fixed to the central disk plate and shroud by welding. The shroud is made of hydraulic draw. The impeller strength is sufficient to operate continuously at maximum power. The impellers balance quality grades are G2.5 in accordance with ISO 1940-1 and AMCA204, BV-4 application category. The stainless or aluminum impeller is also available.

Inlet Cone

The inlet cone is constructed of high grade steel sheet by the aerodynamic profile design. It makes the air into the impeller more stable, pressure losses lesser and fan efficiency higher. The clearance between inlet cone and impeller is accordance with the aerodynamic calculation to increase the fan performance stability efficiently.

入風口固定板

入風口固定板採用優質鋼板加工製作，板面四周採用折邊焊接，增加固定板與底座連接的強度，使得風機在運行的時候固定板能夠承受更大的壓力，減少風機的震動。並針對較大直徑的葉輪增加補強支架，提高風機的穩定與安全。

馬達架

馬達架結構設計，有效減小風機的壓損。結構採鋼板折彎成型，對於受力加大部分增加補強，提高風機運轉的安全性。輪轂的設計保證葉輪與馬達連接的穩定性，提高風機運轉的安全性。

馬達

RP 系列風機使用全密閉三相鼠籠式馬達，符合 IEC 標準。標準馬達的絕緣等級為 F 級，防護等級為 IP54 以上，B 級升溫。使用環境溫度為 $0^{\circ}\text{C}\sim+40^{\circ}\text{C}$ ，馬達軸承壽命為 $L_{10}\geq 100000$ 小時。

Inlet Cone Positioning Plate

Inlet cone positioning plate is constructed of high grade steel sheet. It is flanged and welded in four sides with base board to increase the strength of the structure, making the plate bear highly fan pressure to decrease fan vibration. Considering the larger impeller, additional supports are fixed to improve the fan stability and safety.

Motor Bracket

To the motor bracket is designed to reduce the fan pressure losses. The structure is bended forming steel and the strengthening plate to improve fan running safety. Fan hub is designed to ensure the stability of the impeller fitting the motor, and to improve the fan running safety.

Motor

The motor used in RP-series Fans are totally-enclosed three-phase squirrel-cage motors, they meet the standards of the IEC, Insulation Class F, and Ingress Protection is IP54 or above, B temperature rise. Ambient temperature is $0^{\circ}\text{C}\sim+40^{\circ}\text{C}$. Motor bearing service life (L_{10}) are over 100,000 hours ($L_{10}\geq 100000$ hours).

風機定律 The Fan Laws

1st law :

$$\left[\frac{Q_c}{Q} \right] = \left[\frac{D_c}{D} \right]^3 \left[\frac{N_c}{N} \right] \left[\frac{K_p}{K_{pc}} \right]$$

2nd law :

$$\left[\frac{P_{tc}}{P} \right] = \left[\frac{D_c}{D} \right]^2 \left[\frac{N_c}{N} \right]^2 \left[\frac{K_p}{K_{pc}} \right] \left[\frac{\rho_c}{\rho} \right]$$

3rd law :

$$\left[\frac{P_{vc}}{P} \right] = \left[\frac{D_c}{D} \right]^2 \left[\frac{N_c}{N} \right]^2 \left[\frac{\rho_c}{\rho} \right]$$

4th law :

$$\left[\frac{H_c}{H} \right] = \left[\frac{D_c}{D} \right]^5 \left[\frac{N_c}{N} \right]^3 \left[\frac{K_p}{K_{pc}} \right] \left[\frac{\rho_c}{\rho} \right]$$

5th law :

$$P_{sc} = P_{tc} - P_{vc}$$

Where P_{tc} and P_{vc} are established per the 2nd and 3rd FAN LAW.

6th law :

$$\eta_{sc} = \eta_{tc} \left[\frac{P_{sc}}{P_{tc}} \right]$$

Where P_{sc} is established using the 5th FAN LAW and P_{tc} is established using the 2nd FAN LAW.

The subscript c denotes the new operating condition, and:

D = Impeller diameter

D_c = Impeller diameter, converted

N = Impeller rotational speed

N_c = Impeller rotational speed, converted

K_p = Compressibility coefficient

K_{pc} = Compressibility coefficient, converted

Q = Volume airflow rate

Q_c = Volume airflow rate, converted

P_t = Pressure, total

P_{tc} = Pressure, total, converted

P_v = Pressure, velocity

P_{vc} = Pressure, velocity, converted

H = Power

H_c = Power, converted

P_s = Pressure, static

P_{sc} = Pressure, static, converted

η_{sc} = Efficiency, static, converted

η_{tc} = Efficiency, total, converted

自由音場 Non-Directional Sound in a Free-Field

聲功率和聲壓之間的最簡單的關係為一個非方向性聲源的自由音場，其關係如下列方程式所示：

The simplest relation between sound power level and sound pressure level is found for a free-field, non-directional sound source, as given by the following equation :

$$L_p = L_{wi} - 20 \log_{10}(r) - k + T$$

L_p = sound pressure level (dB) re $20 \mu\text{Pa}$

L_{wi} = sound power level (dB) re 10^{-12} watts

r = distance from the source in meters or feet

k = 11.0 dB for metric units and 0.5 dB for English units

T = correction factor for atmospheric pressure and temperature (dB) (since most industrial noise problems are concerned with air at or near standard conditions, T is usually negligible and, therefore, equals 0)

Example :

計算在自由音場中 110 dB 的聲功率距離聲源 10 英尺時的聲壓：

Consider a point source having a L_{wi} of 110 dB for a free-field . The sound pressure level at a distance of 10 feet from the source would be calculated as follows (since the source is found for a free-field, the equation for hemispherical radiation from a point source is used) :

$$L_p = L_{wi} - 20 \log_{10}(r) - k$$

therefore :

$$L_p = 110 \text{ dB} - 20 \log_{10}(20) - 0.5 = 89.5 \text{ dB}$$

範例 Example Of Curve Reading

風量

Air Volume $Q = 6 \text{ m}^3/\text{s}$
 $= 21600 \text{ m}^3/\text{h}$

風速

Outlet Velocity $V = 11 \text{ m/s}$

全壓

Total Pressure $P_t = 700 \text{ Pa}$

動壓

Vel. Pressure $P_v = 72 \text{ Pa}$

靜壓

Static Pressure $P_s = P_t - P_v$
 $= 628 \text{ Pa}$

轉速

Fan Speed $N = 1200 \text{ rpm}$

軸功率

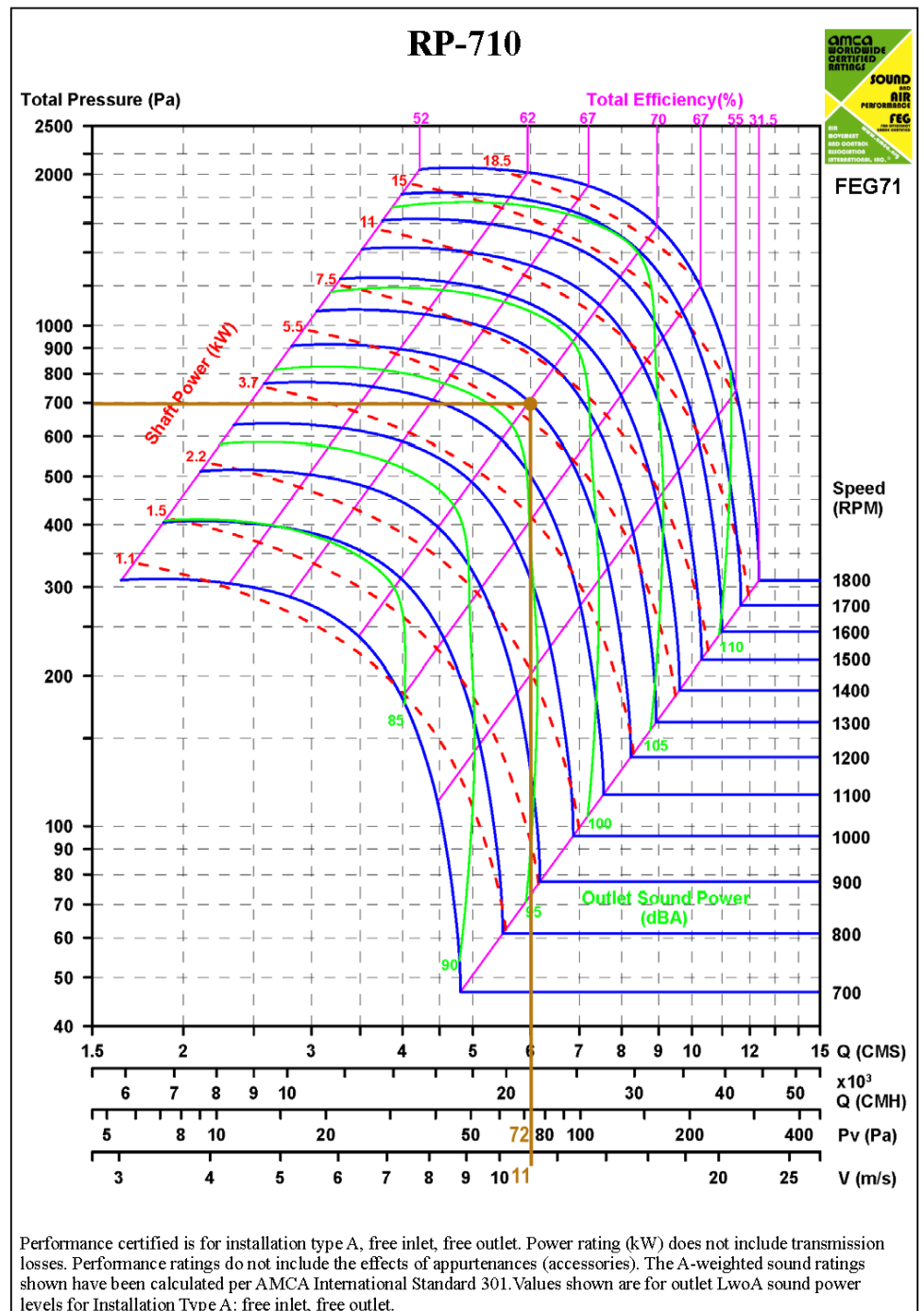
Shaft Power $W = 5.98 \text{ kW}$

聲功率

Sound Power $L_{w0} A = 96.2 \text{ dB(A)}$

總效率

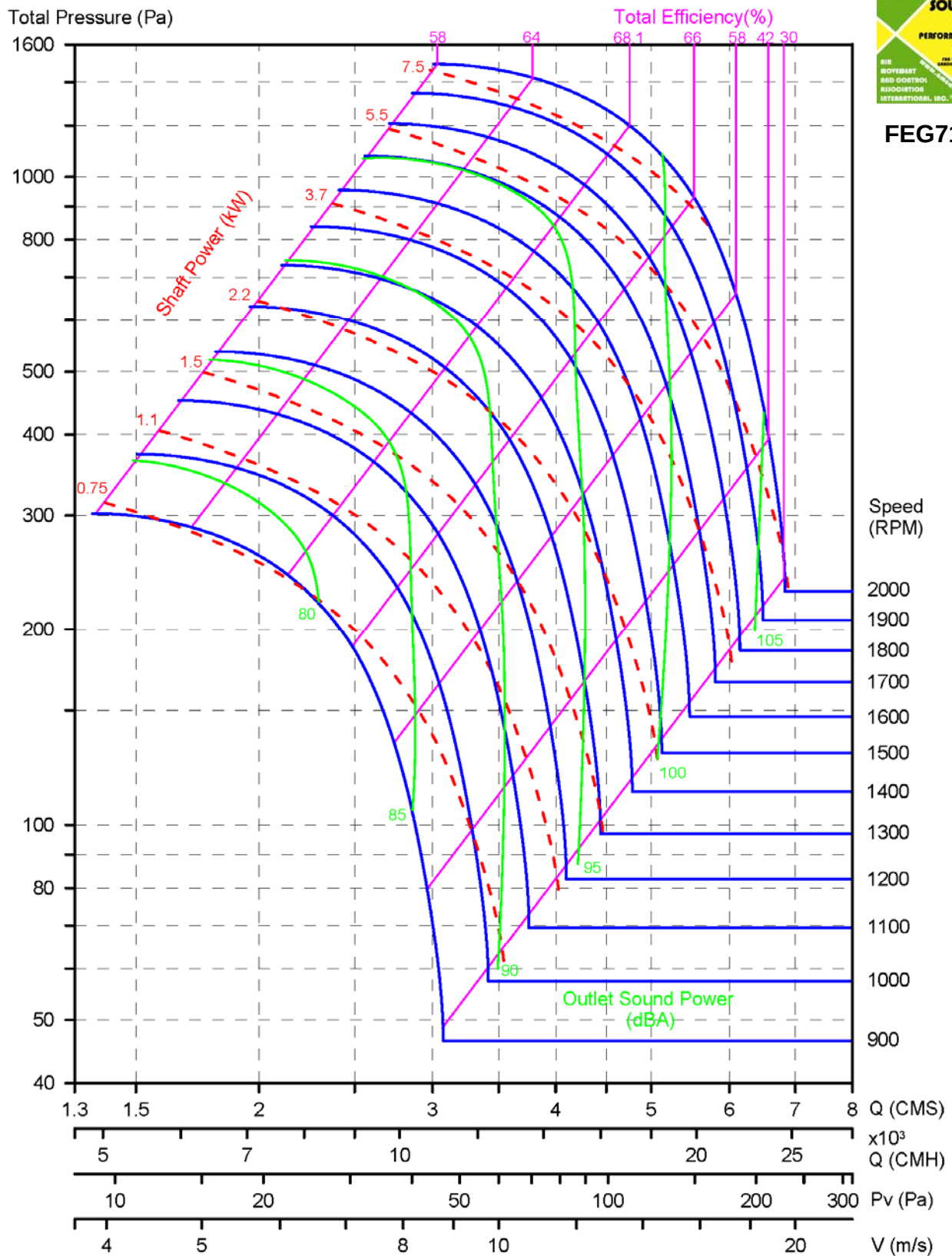
Total Efficiency $\eta = 69.8 \%$



RP-560

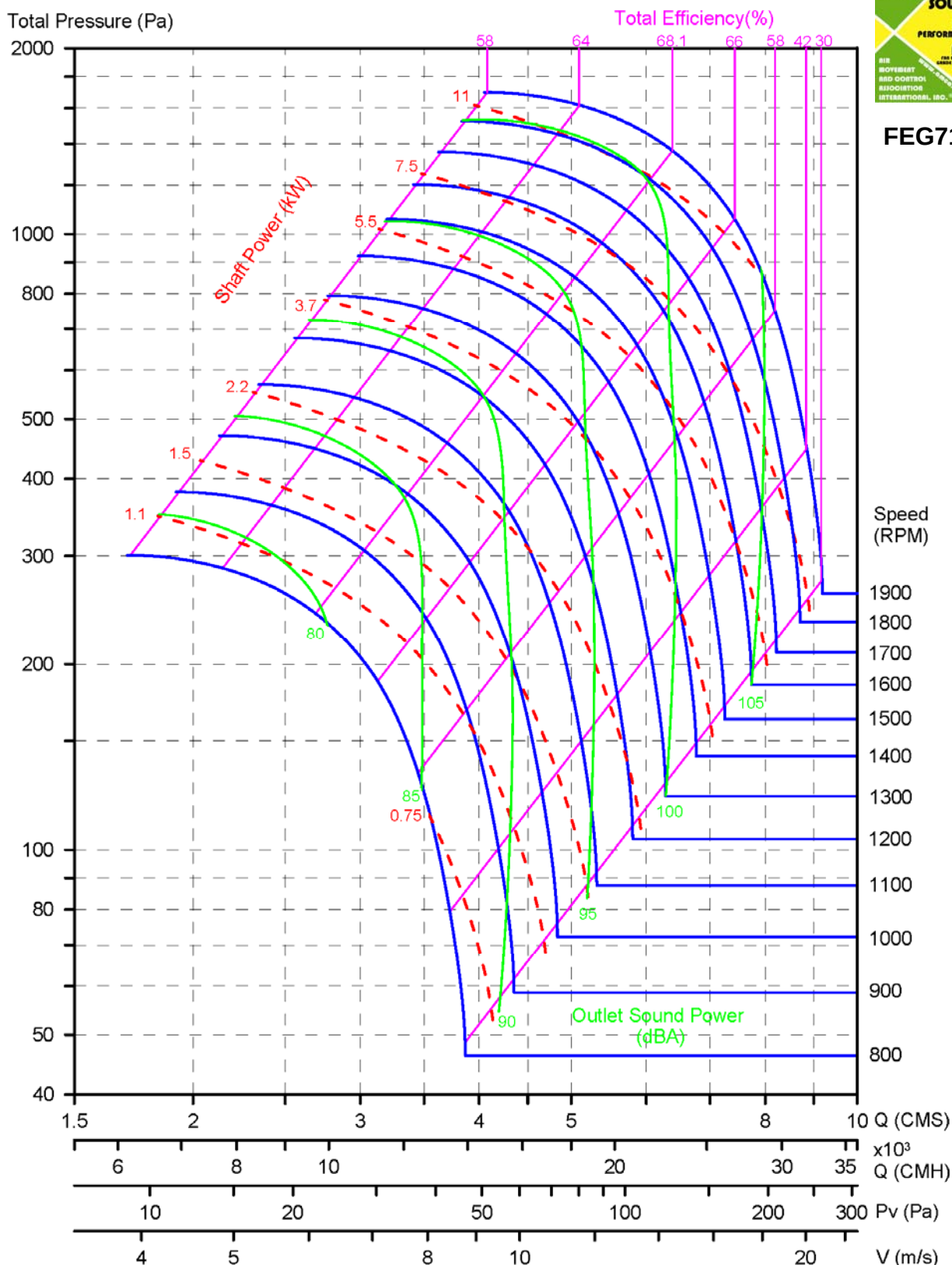


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Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet LwoA sound power levels for Installation Type A: free inlet, free outlet.

RP-630

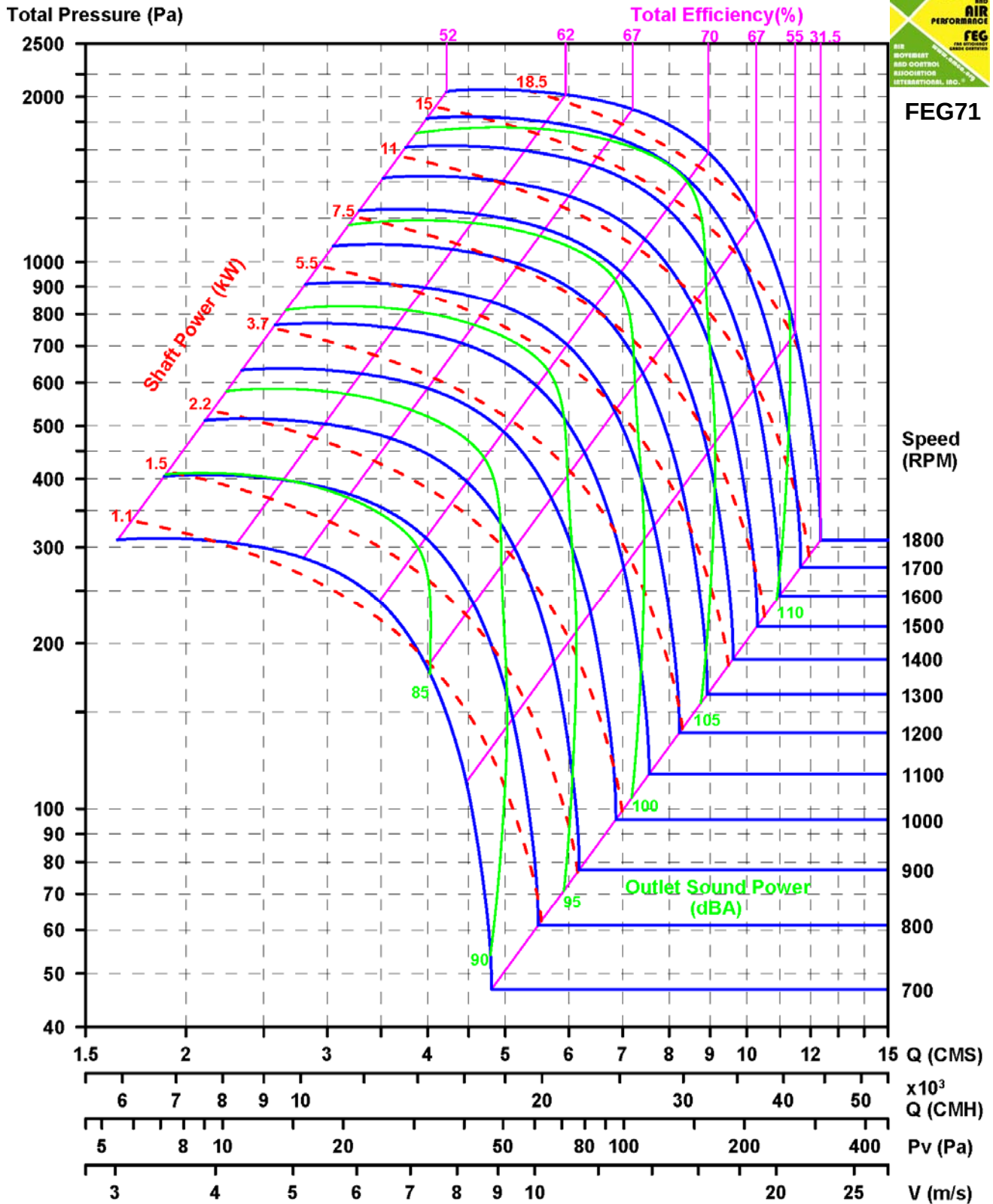


Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet L_{woA} sound power levels for Installation Type A: free inlet, free outlet.

RP-710



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Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet LwA sound power levels for Installation Type A: free inlet, free outlet.

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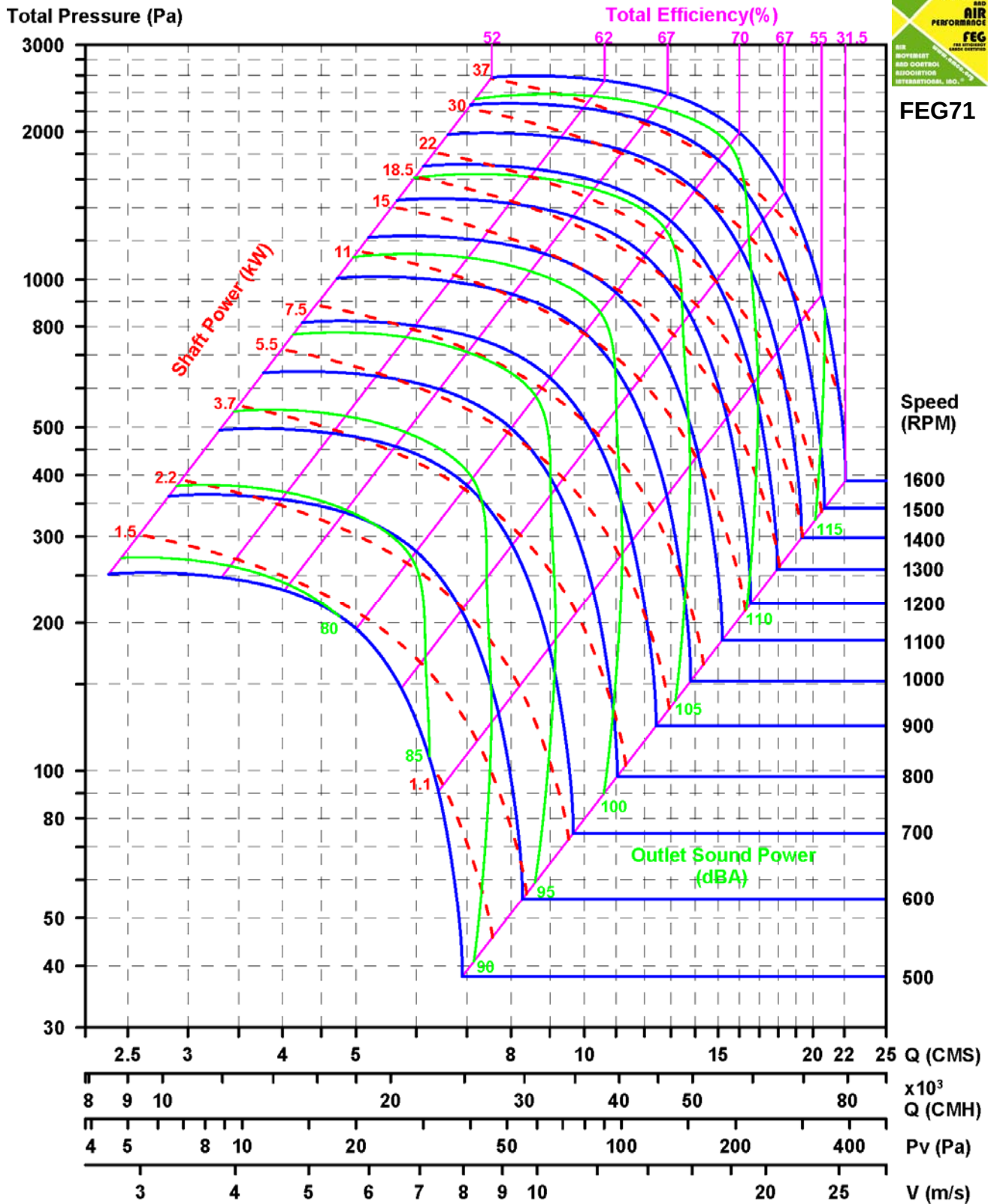
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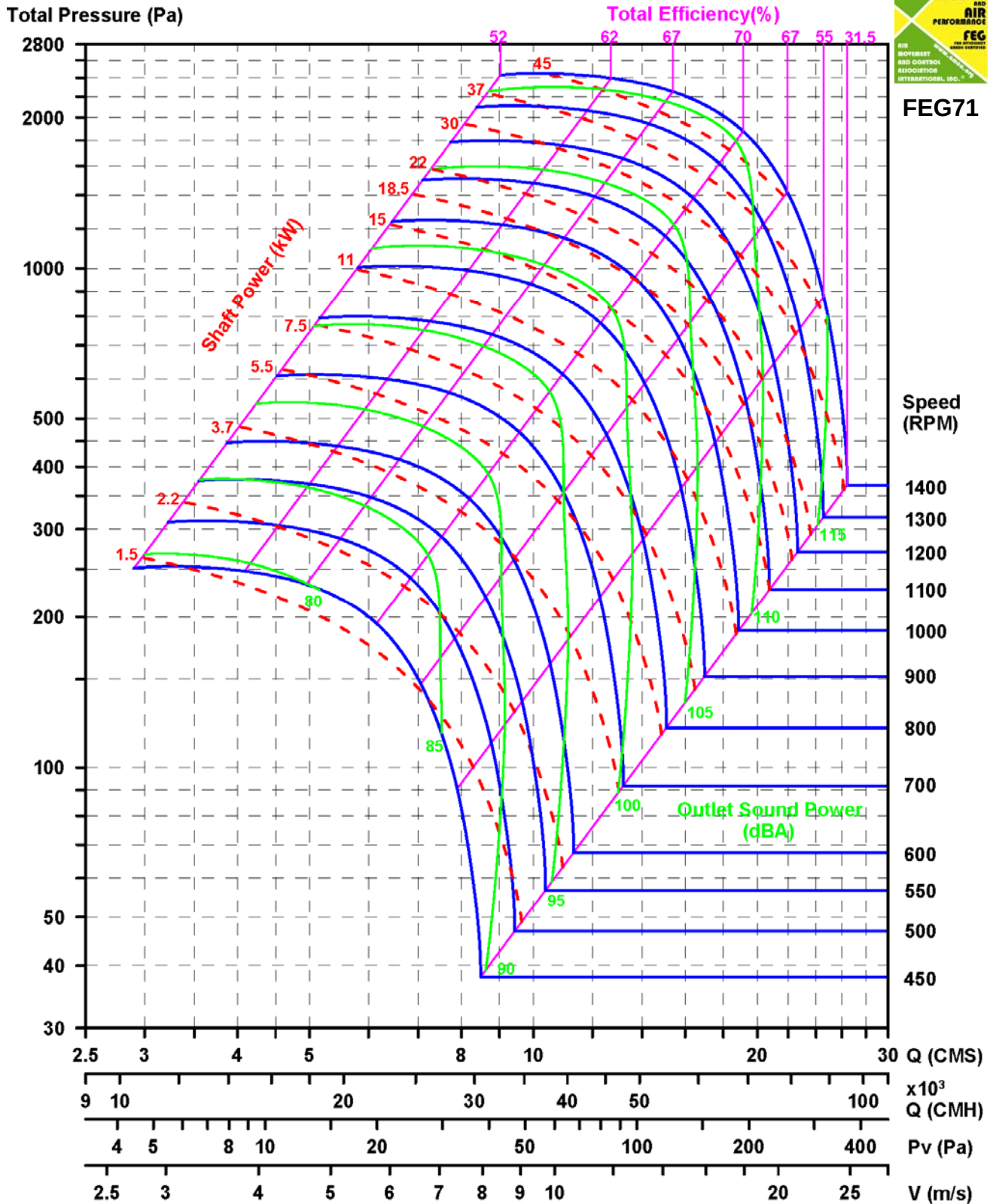


Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet L_{woA} sound power levels for Installation Type A: free inlet, free outlet.

RP-1000



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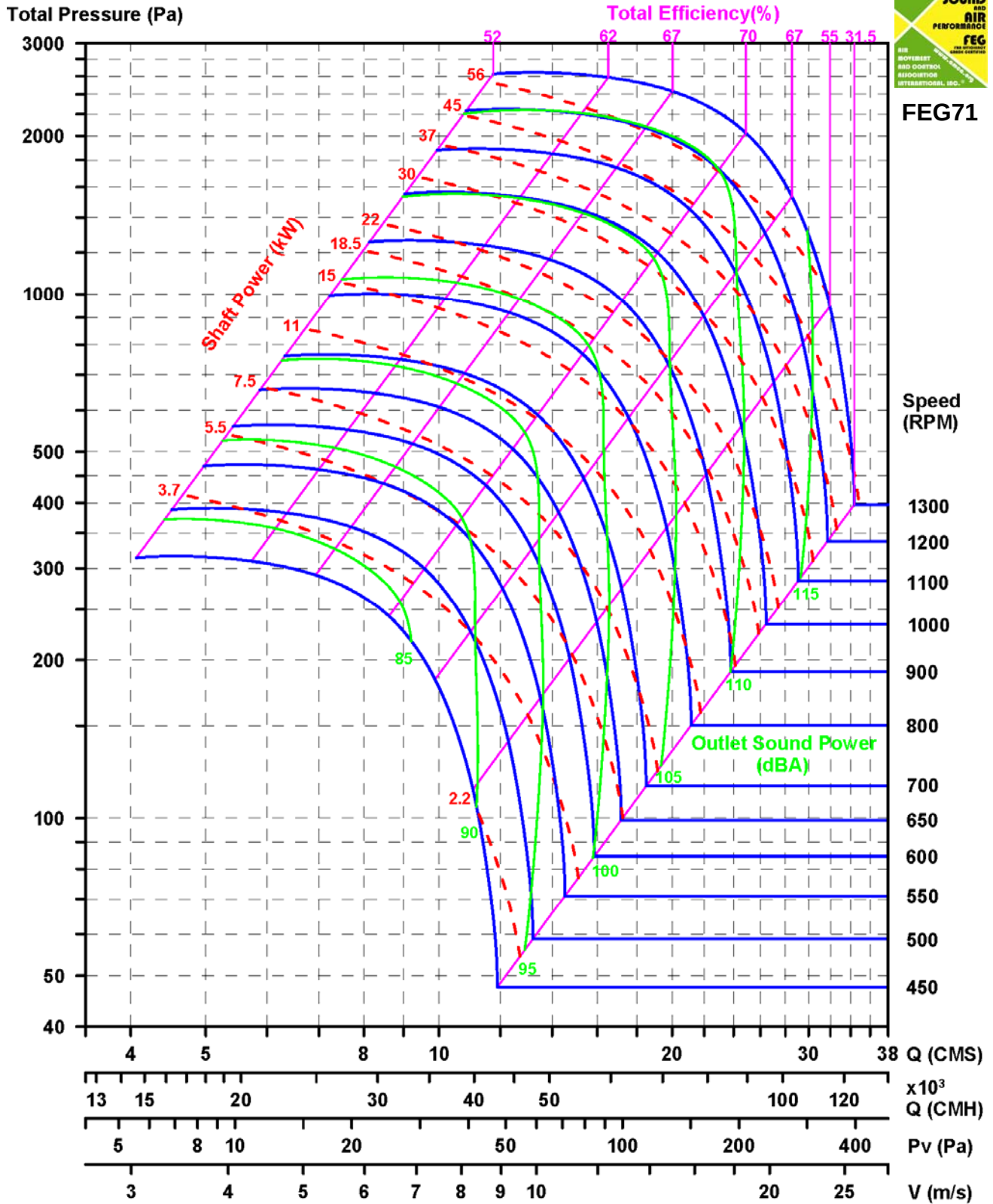


Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet L_{woA} sound power levels for Installation Type A: free inlet, free outlet.

RP-1120



FEG71

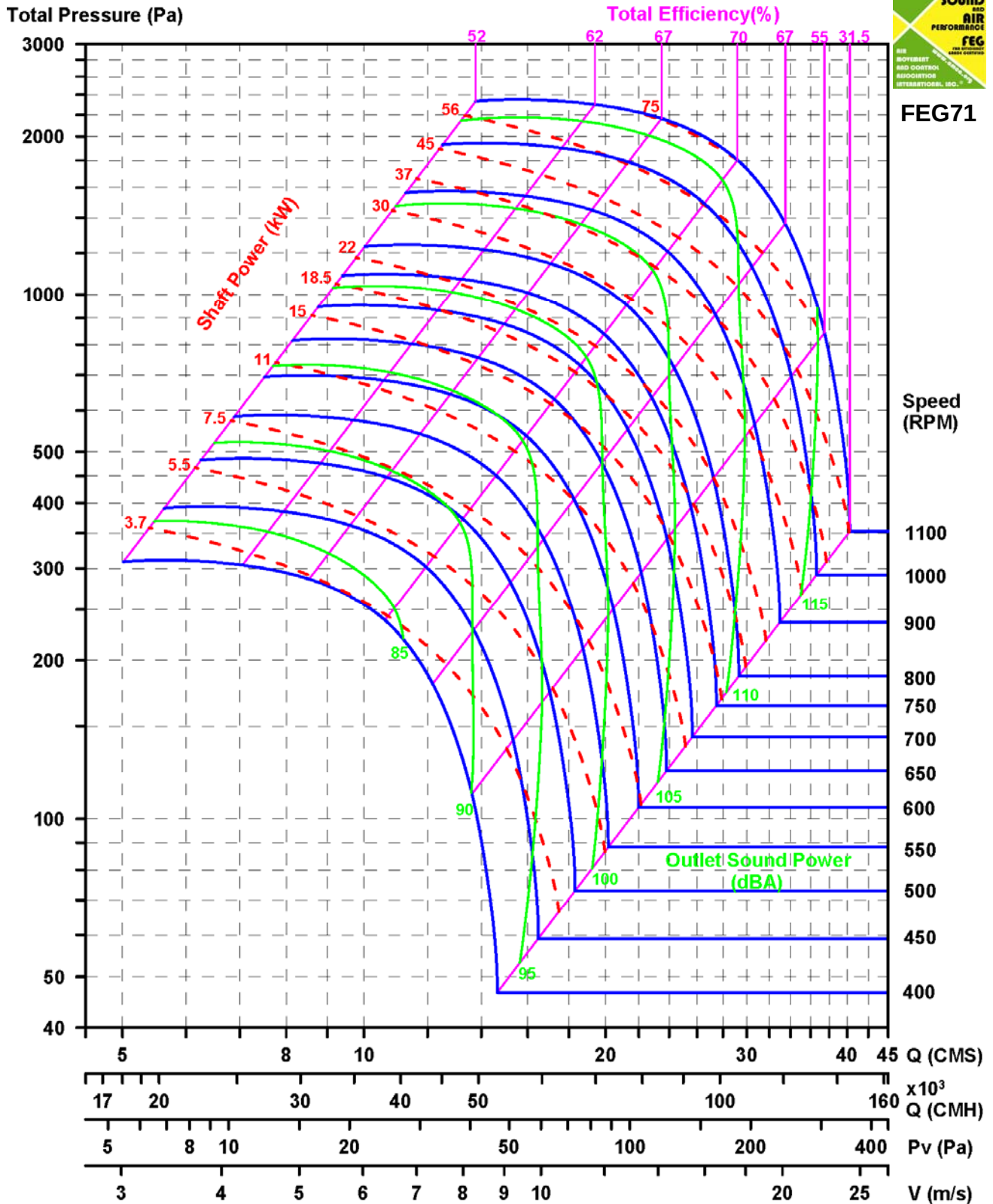


Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet LwA sound power levels for Installation Type A: free inlet, free outlet.

RP-1250



FEG71

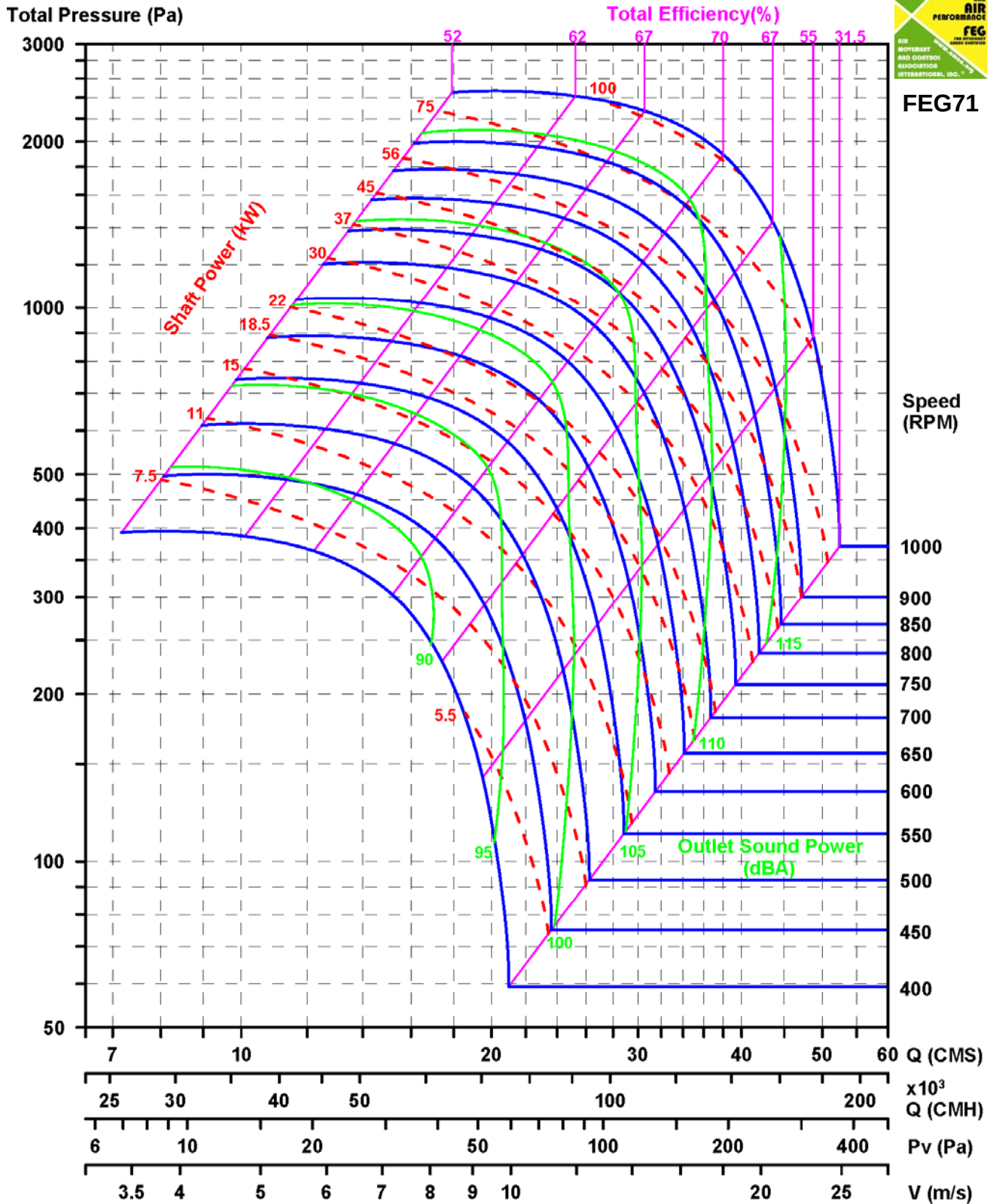


Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet LwoA sound power levels for Installation Type A: free inlet, free outlet.

RP-1400

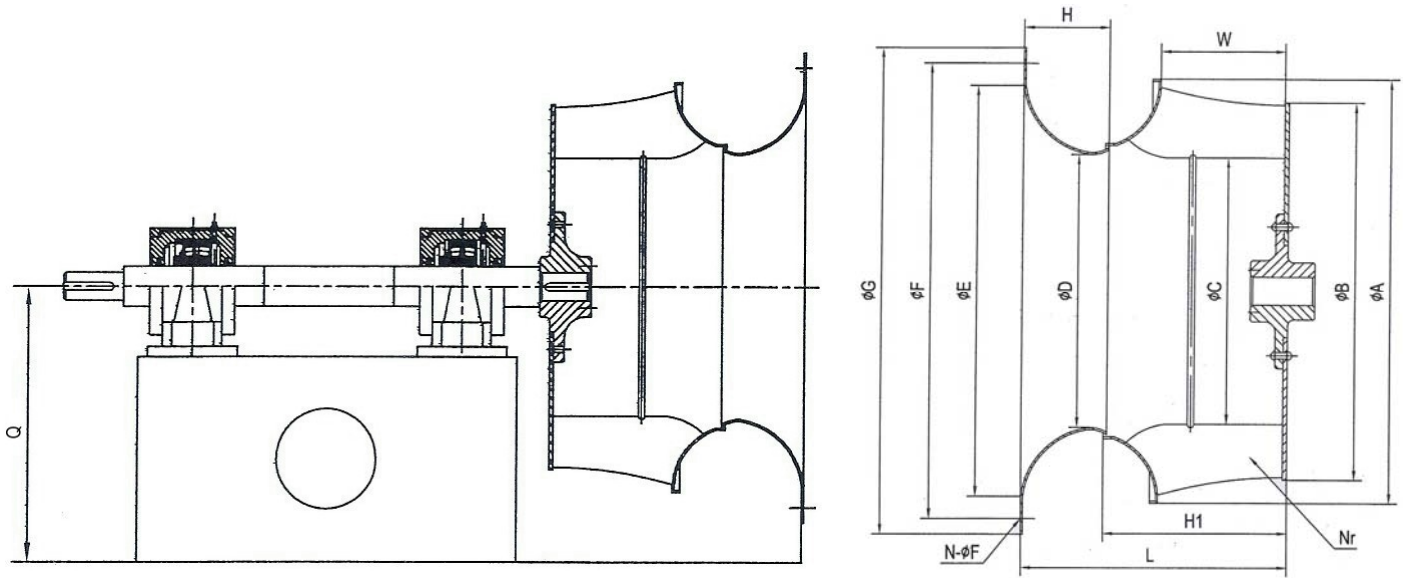


FEG71



Performance certified is for installation type A, free inlet, free outlet. Power rating (kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The A-weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for outlet L_{woA} sound power levels for Installation Type A: free inlet, free outlet.

RP 系列之外型尺寸 Overall Dimension - RP Series



	A	B	C	D	E	F	G	H	H1	L	Nr	N-φ F	Q	W
560	640	570	450	430	636	680	720	139	274	407	7	16-φ 12	400	190
630	720	640	508	485	718	760	800	154	308	459	7	16-φ 12	453	215
710	810	720	501	530	810	860	900	171	345	509	9	16-φ 15	495	245
800	910	810	568	601	910	970	1010	195	387	574	9	16-φ 15	560	274
900	1010	910	636	670	1015	1070	1100	218	437	646	9	24-φ 15	625	307
1000	1130	1010	705	748	1140	1200	1250	242	486	718	9	24-φ 17	690	341
1120	1160	1130	790	838	1260	1320	1370	243	541	773	9	24-φ 17	775	381
1250	1410	1260	883	935	1410	1510	1560	313	605	906	9	24-φ 17	860	430
1400	1610	1420	995	1050	1590	1700	1750	359	670	1015	9	24-φ 17	970	485

Note : The data such as performance, dimension and etc. in this catalogue is subject to change without notice. Please contact with the manufacture for further information.