KRUGER

MXC Series

INLINE CENTRIFUGAL MIXED FLOW FAN

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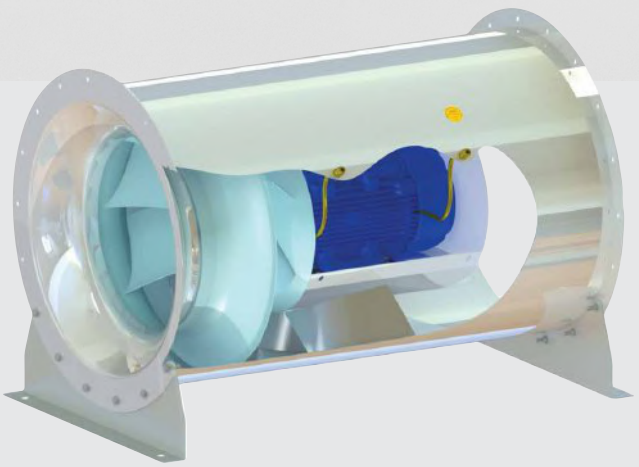
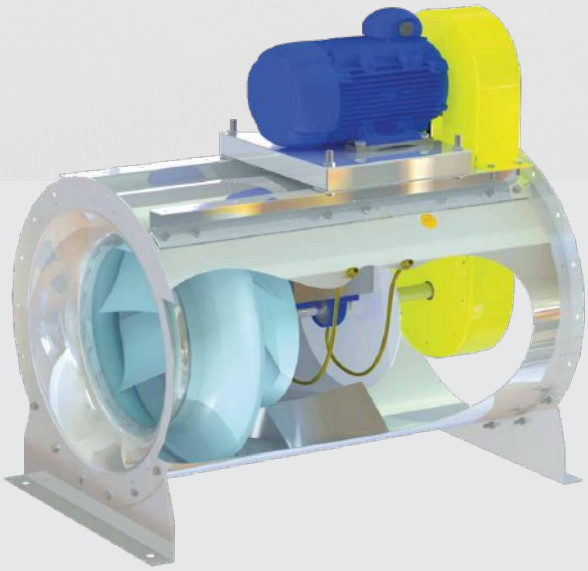
A GLOBAL POWERHOUSE - THE MIXED-FLOW (MXC)

The two most popular types of fan categories are “axial” and “centrifugal” and both offer unique characteristics which are great for certain applications, but a mixed-flow is basically a combination of the two.

- An axial fan provides high amounts of air volume, but it cannot handle high pressure applications
- A centrifugal fan performs really well in high pressure applications, but it does not provide as much air volume as an axial fan
- A mixed-flow fan borrows from both technologies to make a fan that can provide higher air volume than a typical centrifugal fan, but higher pressure than an axial fan

In almost any inline-fan application, the mixed-flow fan is the best option. Also, mixed-flow fans have great sound characteristics. In pressure applications above 250 Pa, they have better sound quality and they are quieter.





The Engineering Team

When the S&P Kruger Team (Thailand) dives into the research and development of a key new product line, they dive *all* the way in.

To do this, the S&P Kruger Team (Thailand) focused the core of the development in Asia at the Thailand R&D center, which boasts several impressive features on their own:

- 3 AMCA 210 chambers, 2 AMCA 300 Reverberant Sound Rooms, and one AMCA 250 Thrust Force Test Unit
- Mechanical Engineers led by management with several years of fan experience, and a lead engineer with a PHD in aerodynamics.

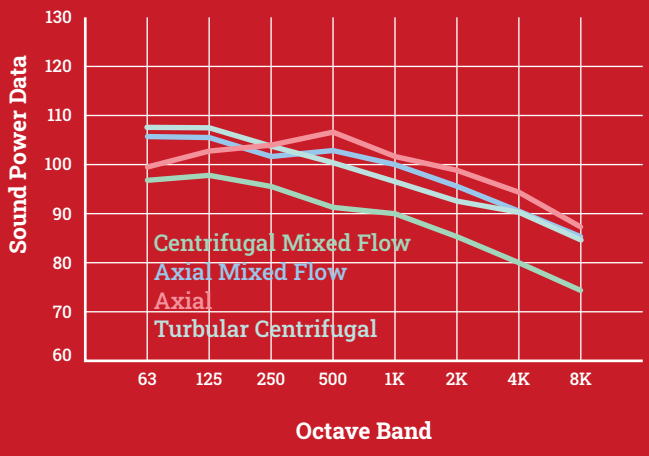
Then the S&P Kruger Team (Thailand) sought input and assistance from other global engineering teams who were able to collaborate with Thailand to supply any local or regional requirements that Thailand might not already know. Those teams are spread throughout the world and boast around 100 fan design engineers in several countries, and an additional 4 AMCA laboratories in Spain, The United States, Mexico, and Brazil. S&P knows that global unity and collaboration leads to the very best products due to a wealth of knowledge and a shared sense of accomplishment when completing something as a global team.

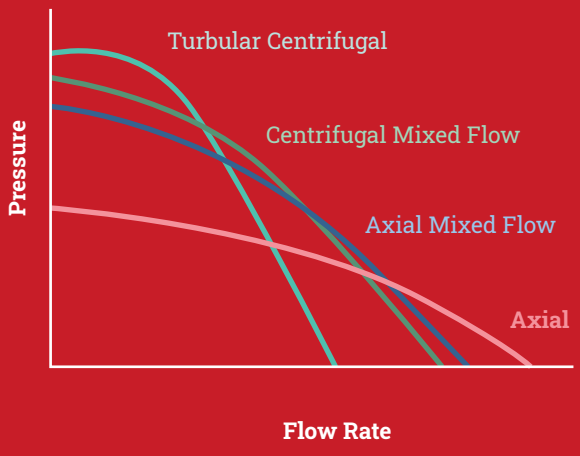
Why the MXC?

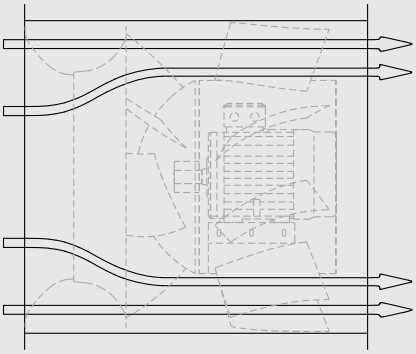
Soler & Palau (S&P) has unique global experts, technology, and teamwork that results in the best designs that can meet the requirements of any regional or local requirements. These unique abilities have led to the best mixed-flow fan in the global ventilation industry.

This great design results in lower upfront costs and lower energy consumption for the end user.

Finally, this unique fan type is perfect for so many applications, that ultimately using mixed-flow fans makes things easier for designers, installers, and end users.

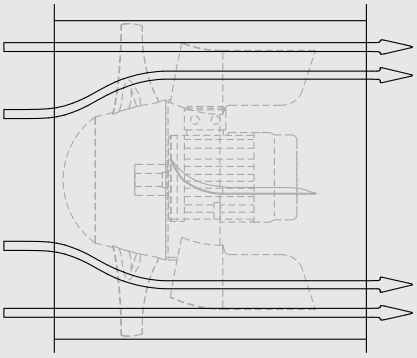






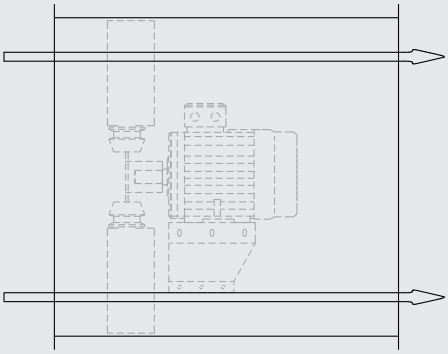
CENTRIFUGAL MIXED FLOW

- Smooth air flow direction through mixed flow impeller
- High pressure characteristic close to centrifugal fan at lower fan speed
- Lower noise at same fan size of traditional axial and centrifugal fan



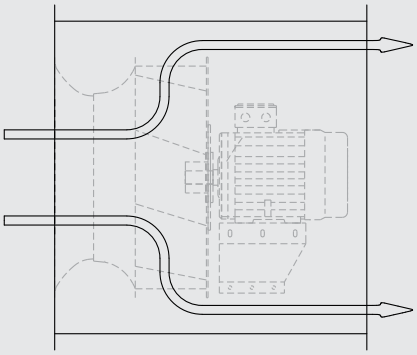
AXIAL MIXED FLOW

- Unique designed axial mixed flow fan impeller
- Air flow through the impeller in both axial and radial direction
- High pressure characteristic close to centrifugal fan
- Axial air path suitable for installation



AXIAL

- Straight through air flow
- High flow rate, medium pressure characteristic
- Lower efficiency at high pressure region



TURBULAR CENTRIFUGAL

- Two 90° bend in airflow direction
- High pressure characteristic at the same fan speed

Application

General ventilation and smoke extraction in various commercial, industrial and kitchen exhaust application where moderate pressure, high efficiency, and high airflow volume with quiet operation are required.

Range

Size: 315 - 2000
Capacity: up to 230,000 CMH
Static pressure: up to 2,000 Pa

Operating Temperature

- Normal Ventilation: -20°C + 55°C
- High Temperature Application in accordance with EN12101-3 up to 400°C
- Kitchen Exhaust Application up to 200°C

Construction

Double flanged casing is produced in mild steel or galvanized steel with mixed flow wheels. Shafts are manufactured from C45 carbon steel. Bearings used are either deep groove ball bearing type with an adapter sleeve, or spherical roller bearings sealed at both sides. All wheels are statically and dynamically balanced to ISO21940. All fans after assembly are trim-balanced to ISO14694/AMCA 204.

Finish

Zinc rich primer and polyester powder coating or galvanized finishing are available for all mild steed parts.

Motors

Totally Enclosed Class 'F' or 'H', with a min. IP55 protection are fitted as standard.
Motors 3.0kW and above are star/delta starting.
Motor of other specification are available upon request.

Airflow Direction

Air flow from impeller to motor is fitted as standard.

Certification

Kruger Ventilation Industries Asia Co., Ltd Certifies that the **MXC series** shown herein is 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.

Certified by **TÜV SÜD** which is a leading international service organization focusing on consulting, testing, certification and training.

MXC series was tested in accordance with EN12101-3.

Class	Temperature (°C)	Minimum functioning period (minutes)
F_f 250	250	120
F300	300	60
F_f 300	300	120
F400	400	120

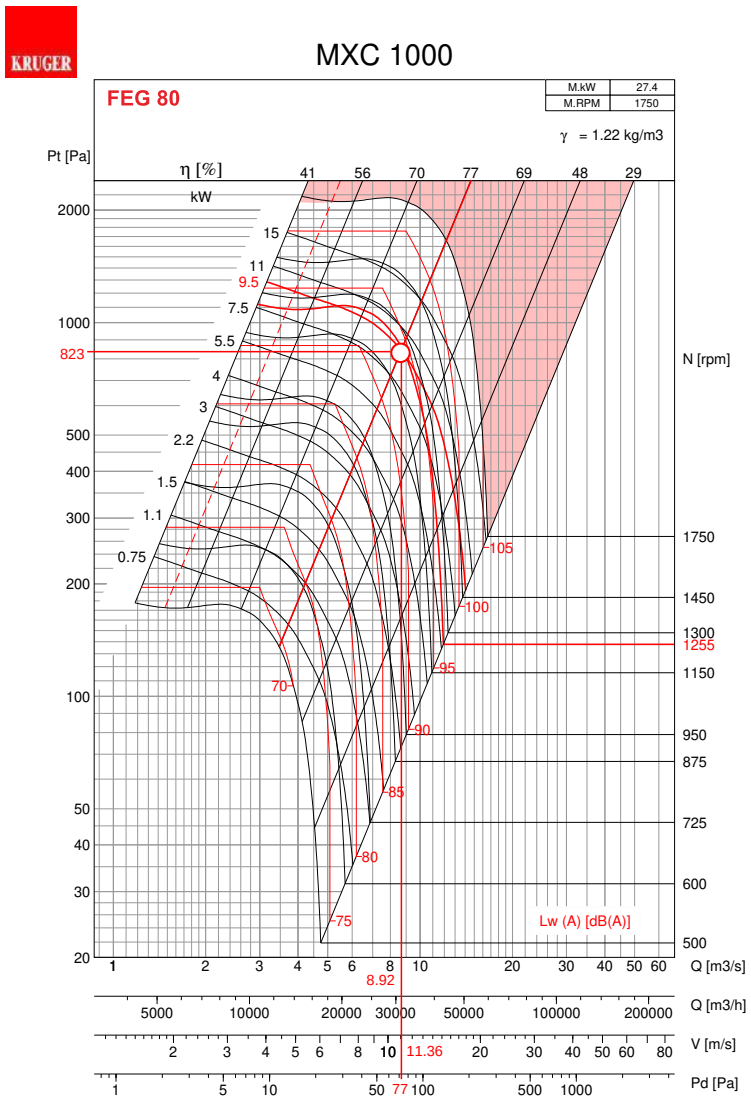
Nomenclature

MXC 1000 - D - N

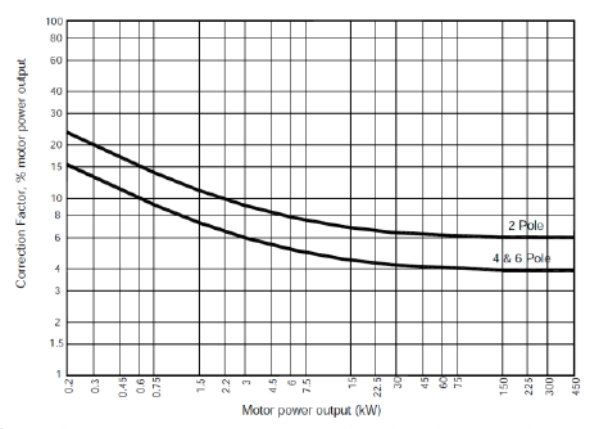
- Fan Design - N = Normal Application
  S = High Temperature Application
  K = Kitchen Exhaust Application
- Drive type - D = Direct Drive
  B = Belt Drive
- Nominal Fan Diameter
- Fan Model

Example of Selection

Air Volume	Q = 32115 m^3/h
Outlet Velocity	V = 11.36 m/s
Dynamic Pressure	Pd = 77 Pa
Total Pressure	Pt = 823 Pa
Fan Speed	N = 1255 rpm
Absorbed Power	W = 9.52 kW
Total Efficiency	η = 77.1%
Sound Power Level	Lw(A) = 94 dB(A)



- Performance certified is for Installation type D – Ducted inlet, Ducted outlet. Performance ratings do not include the effects of appurtenances (belt cover). Power rating kW does not include transmission losses.
- The A–weighted sound ratings shown have been calculated per AMCA International Standard 301. Values shown are for inlet Lwi A sound power levels for installation type D – Ducted inlet, Ducted outlet. Ratings include the effects of duct end correction.



Motor Selection

The power curves shown on each performance graph represent the absorbed power at the shaft of the fan measured in kW.

To determine the power of the motor to be installed, a correction factors should be applied to compensate for transmission losses.

For conversion to horsepower (HP), use multiplying factor 1.34.

Performance

The performance data shown on each diagram is derived from tests conducted in accordance to AMCA Standard 210- Figure 12 - Installation type D (Ducted inlet, Ducted outlet).

Ratings refer to standard air density with the total pressure as a function of the air volume, using logarithmic scale.

It is essential that the same installation type and test standards are used at all time when comparing fan performance.

According to AMCA 205, MXC series can be classify up to FEG 80 based on fan peak efficiency. The following is the explanation of FEG classification:

Fan size is the impeller diameter in mm.

The fan peak efficiency shall be calculated from the fan (total) pressure.

If this method is used for a direct driven fan, the fan efficiency is the impeller efficiency.

The FEG label for a given fan size is assigned when the fan peak efficiency is equal to or lower than the efficiency at the grade upper limit, and higher than the efficiency at the grade upper limit of the next lower grade for the fan size.

For any fan sizes larger than 1016 mm, the values of the grade upper limits are the same as for a size of 1016 mm.

No labels are considered for the fans with the fan peak total efficiency below FEG 50.

The values of efficiencies are calculated for fan sizes in the preferred R40 Series.

Not all available fan sizes are shown.

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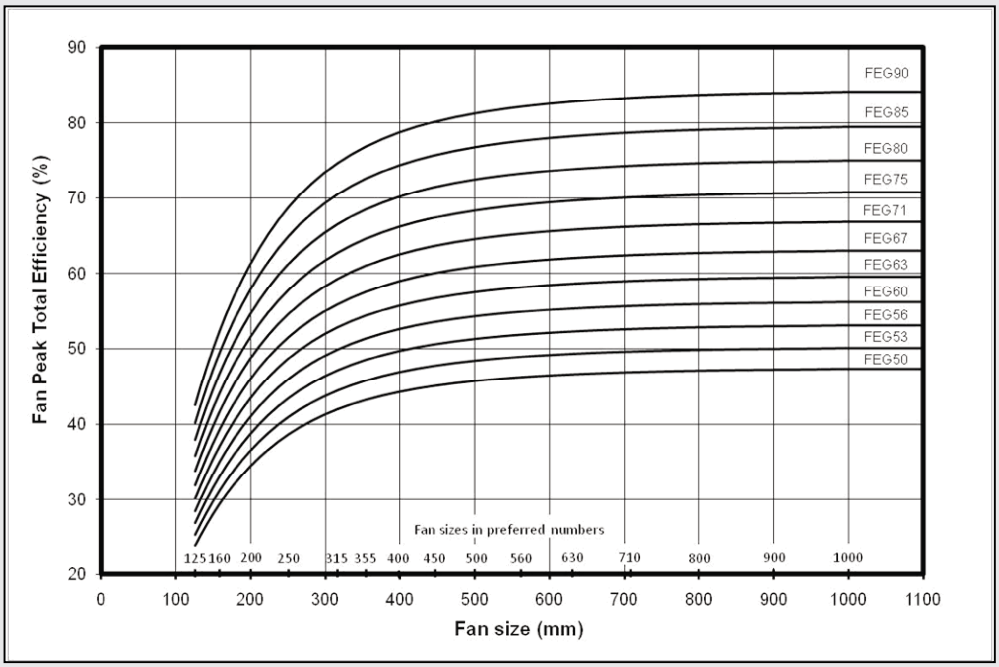
Fan Efficiency Grades (FEG) for Fans without Drives (SI) – AMCA 205



Noise

The noise levels shown on each graph refer to the "A-weighted" sound power values and the data on the inlet side has been measured in accordance with AMCA Standard 300 Fig. 2, Installation Type "D". The noise levels of the fans are determined as follows :

Sound power level - ("A" scale): Lw (A) as catalogue

Octave band spectrum: Lw = Lw(A) + Lw rel. dB [refer to Kruger for more details]

Sound pressure level:

a) free field conditions
$Lp(A) = Lw(A) - (20\log_{10}d) - 11$

b) room conditions
$Lp(A) = Lw(A) - (20\log_{10}d) - 8$

where d = distance from fan (m)

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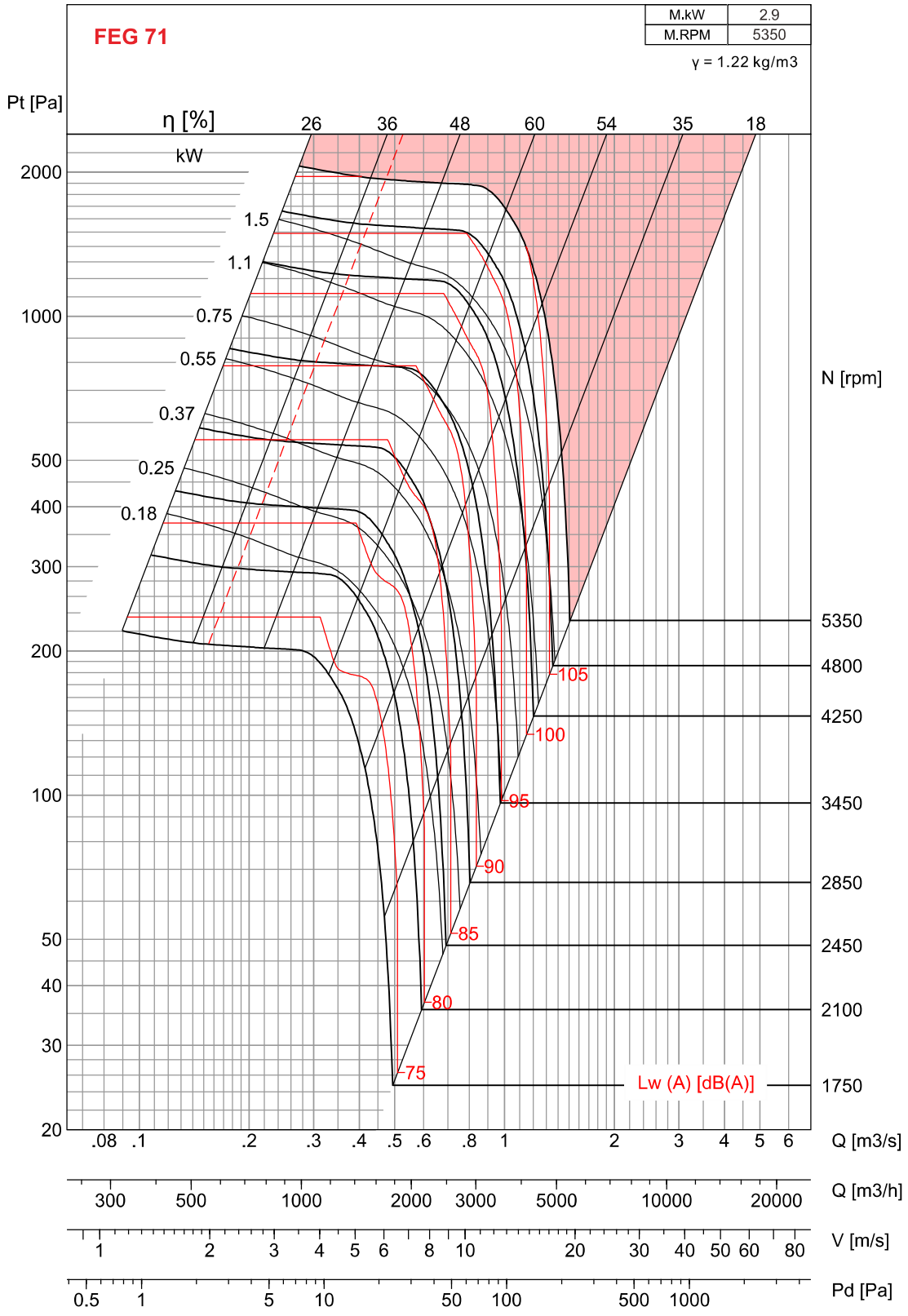
MXC 315



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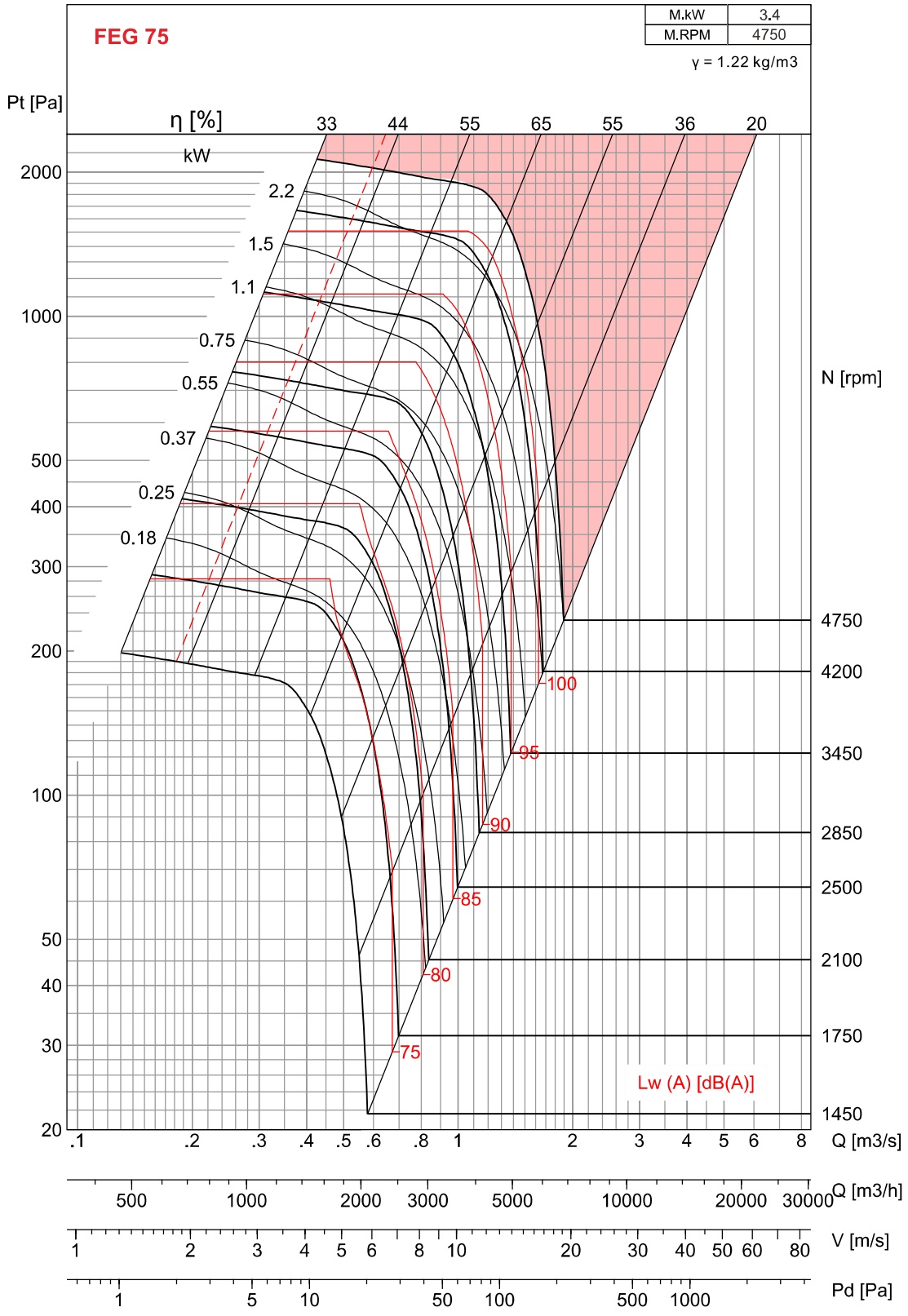
MXC 355



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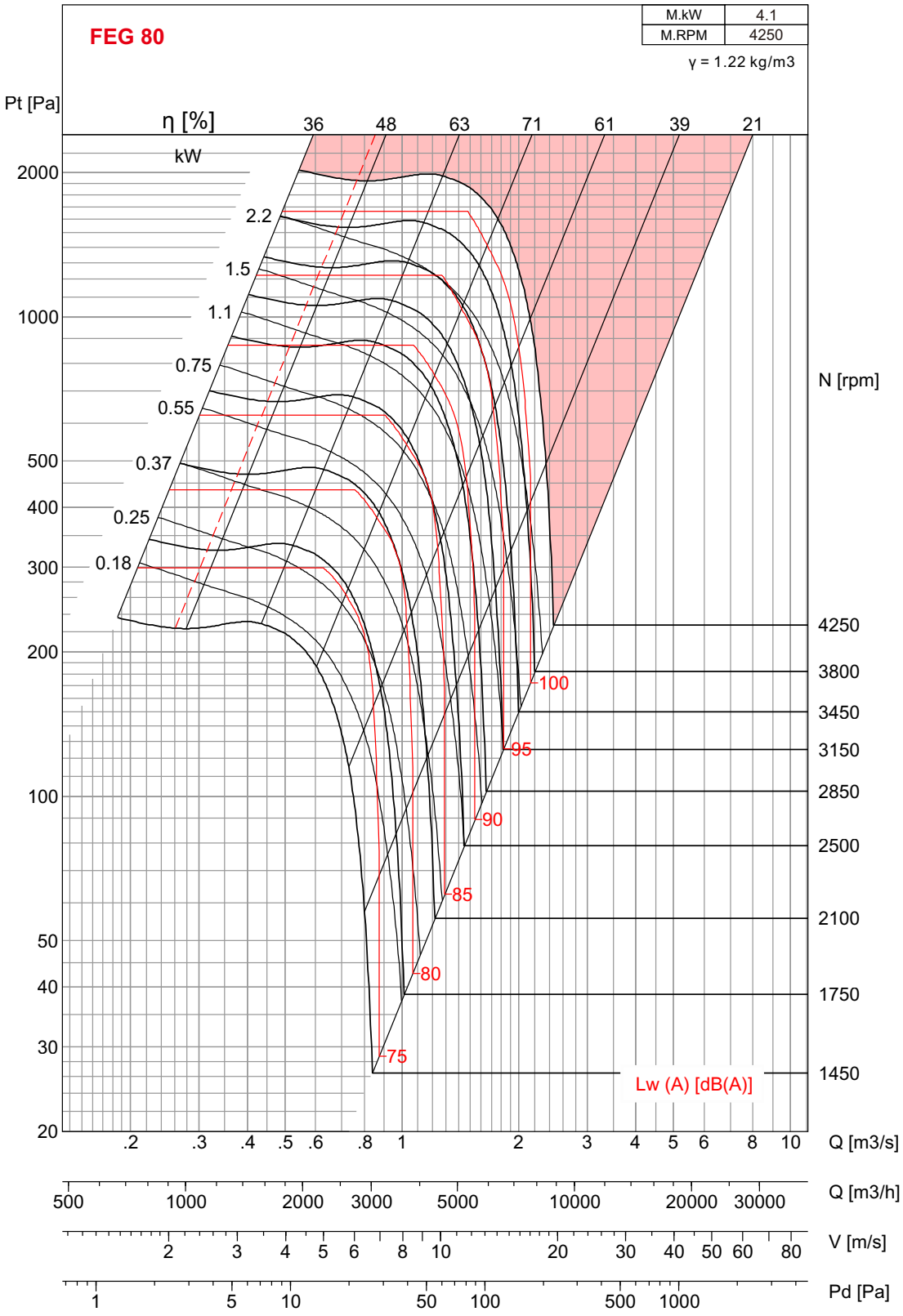
MXC 400



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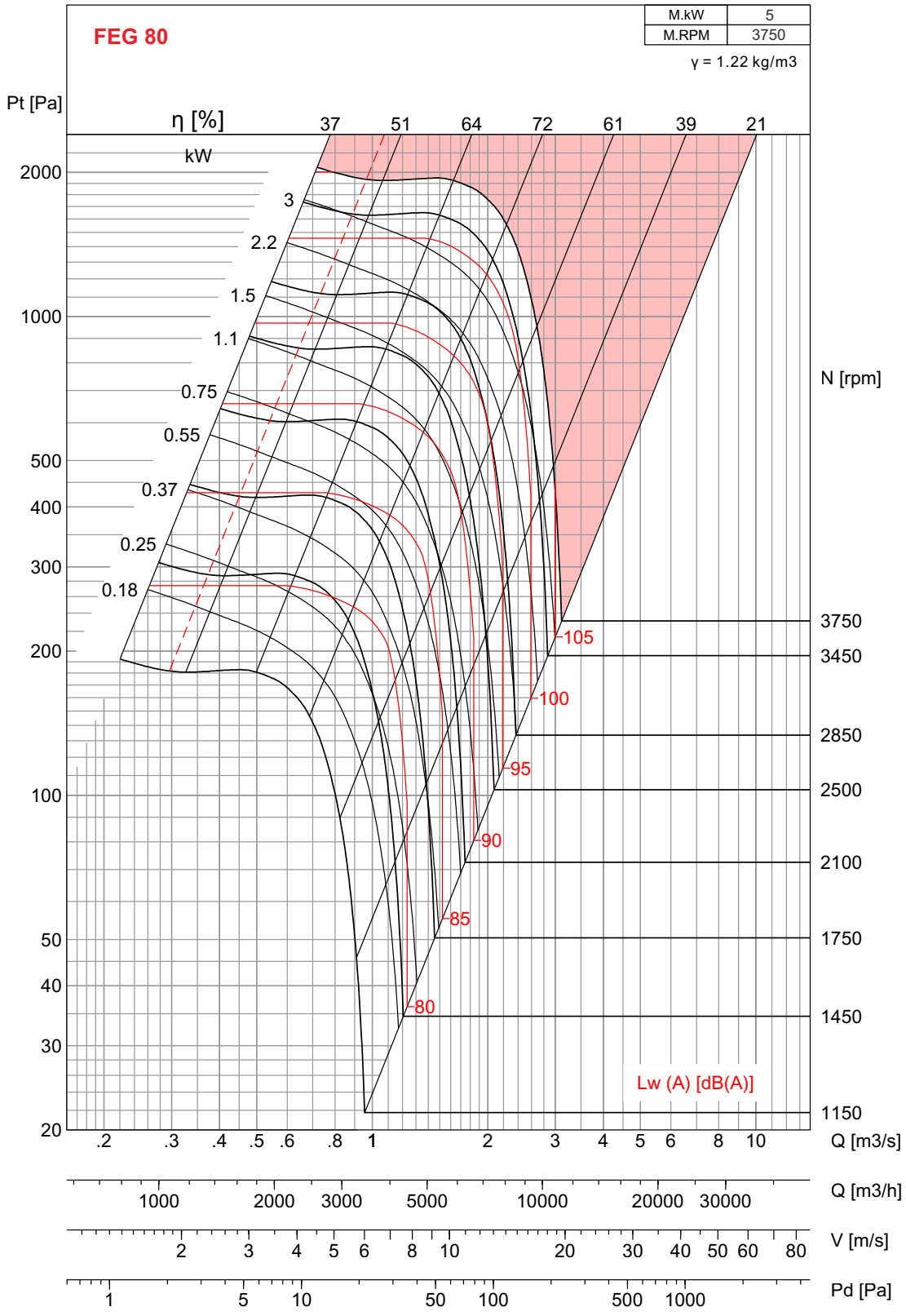
MXC 450



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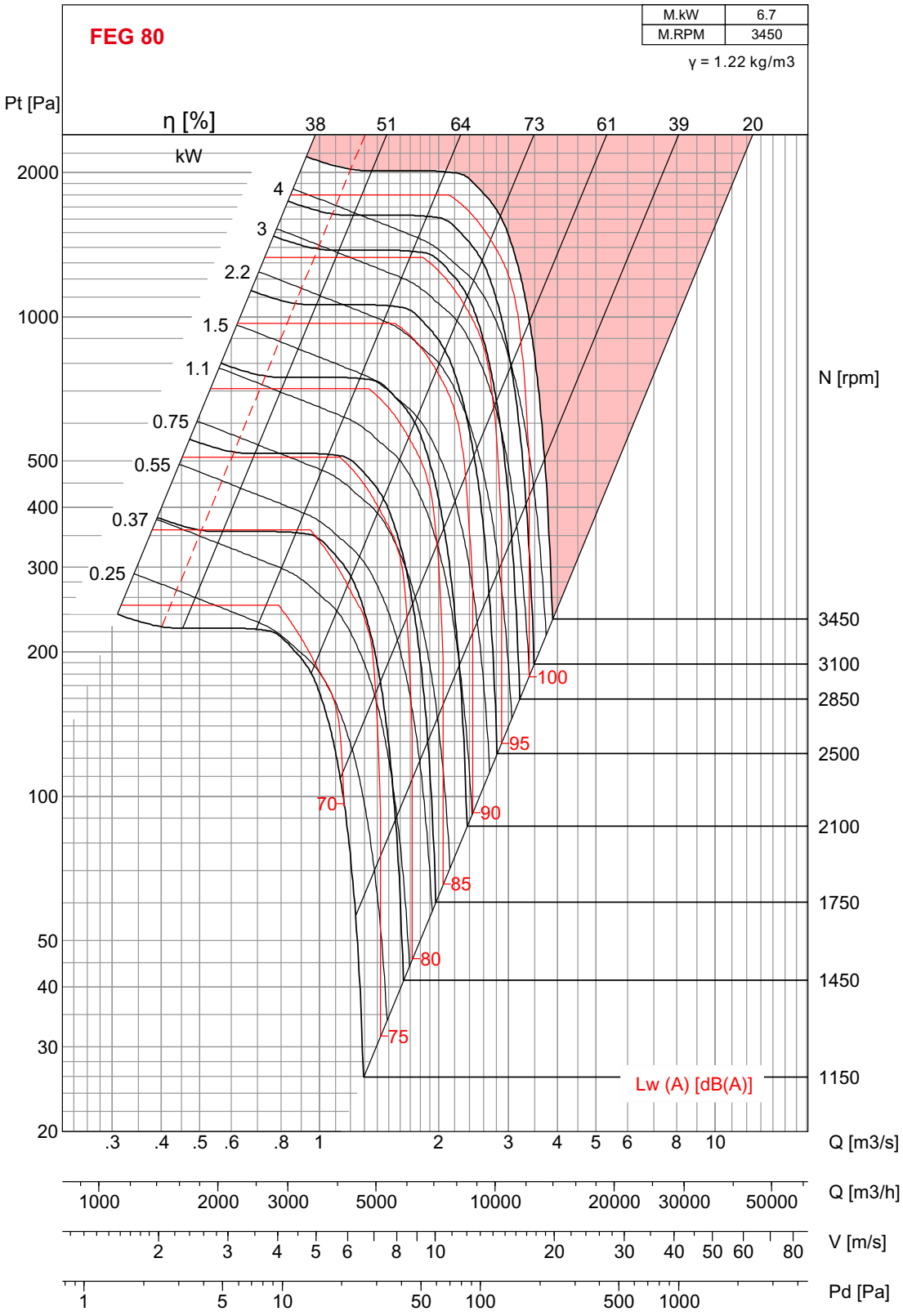
MXC 500



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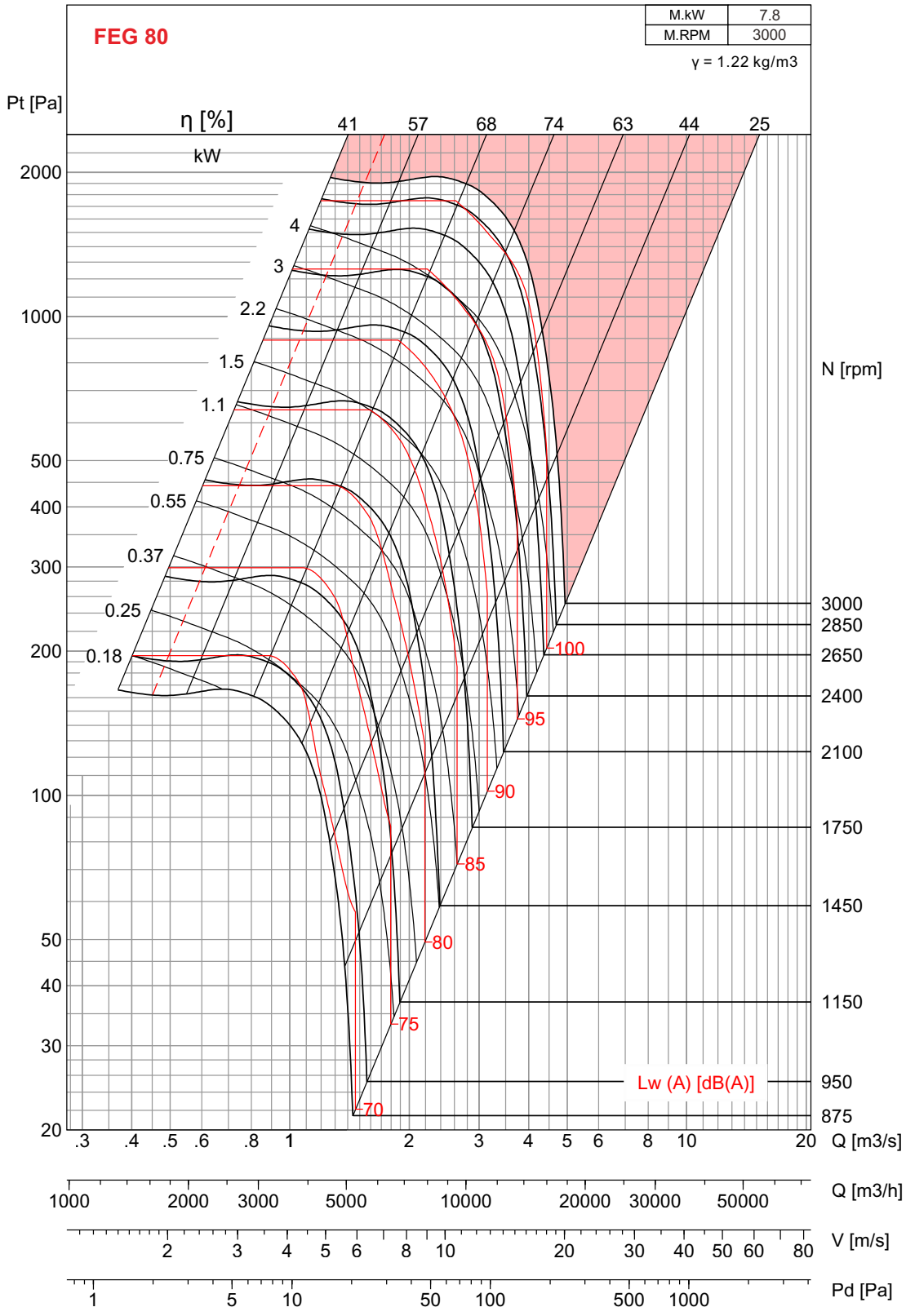
MXC 560



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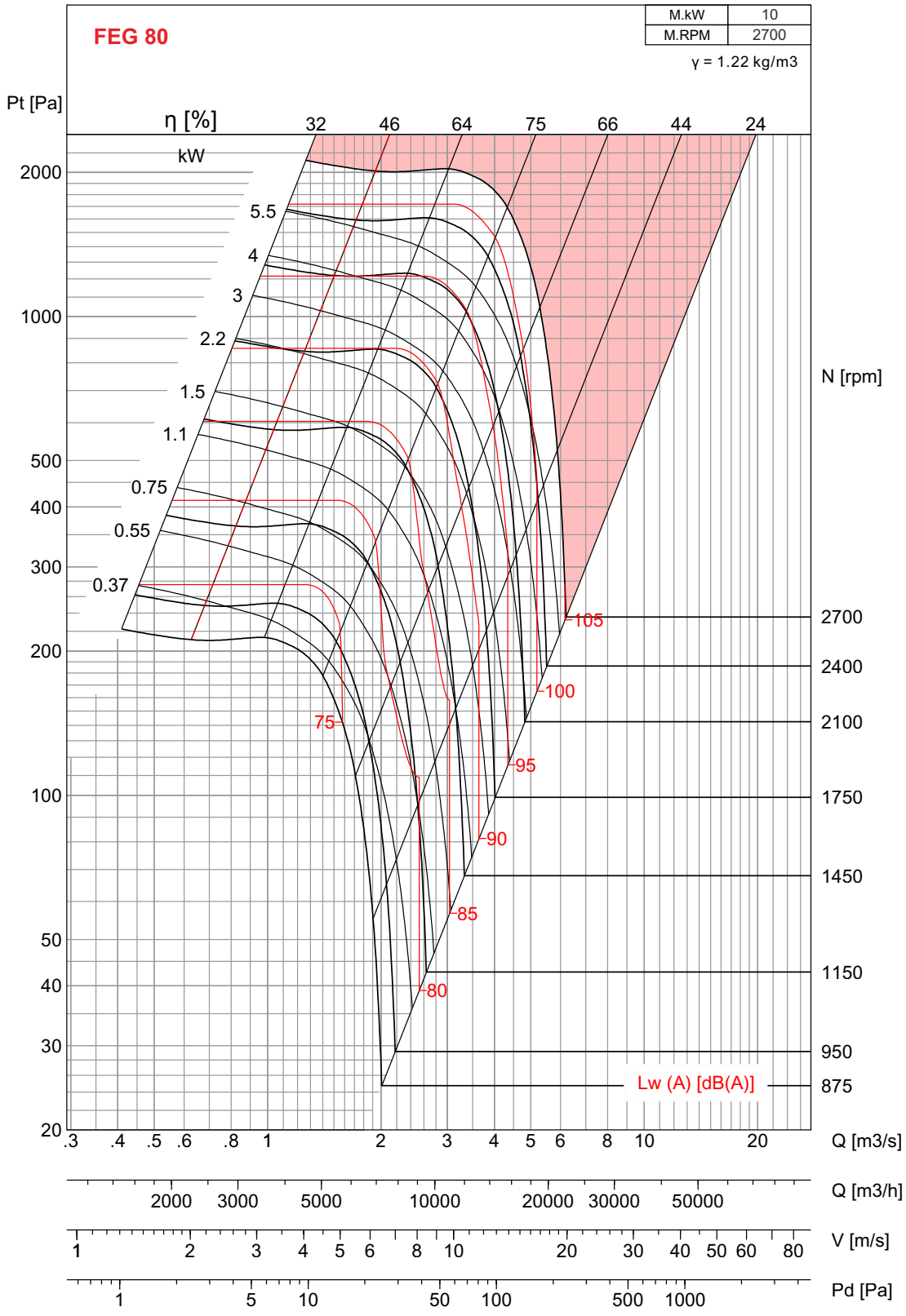
MXC 630



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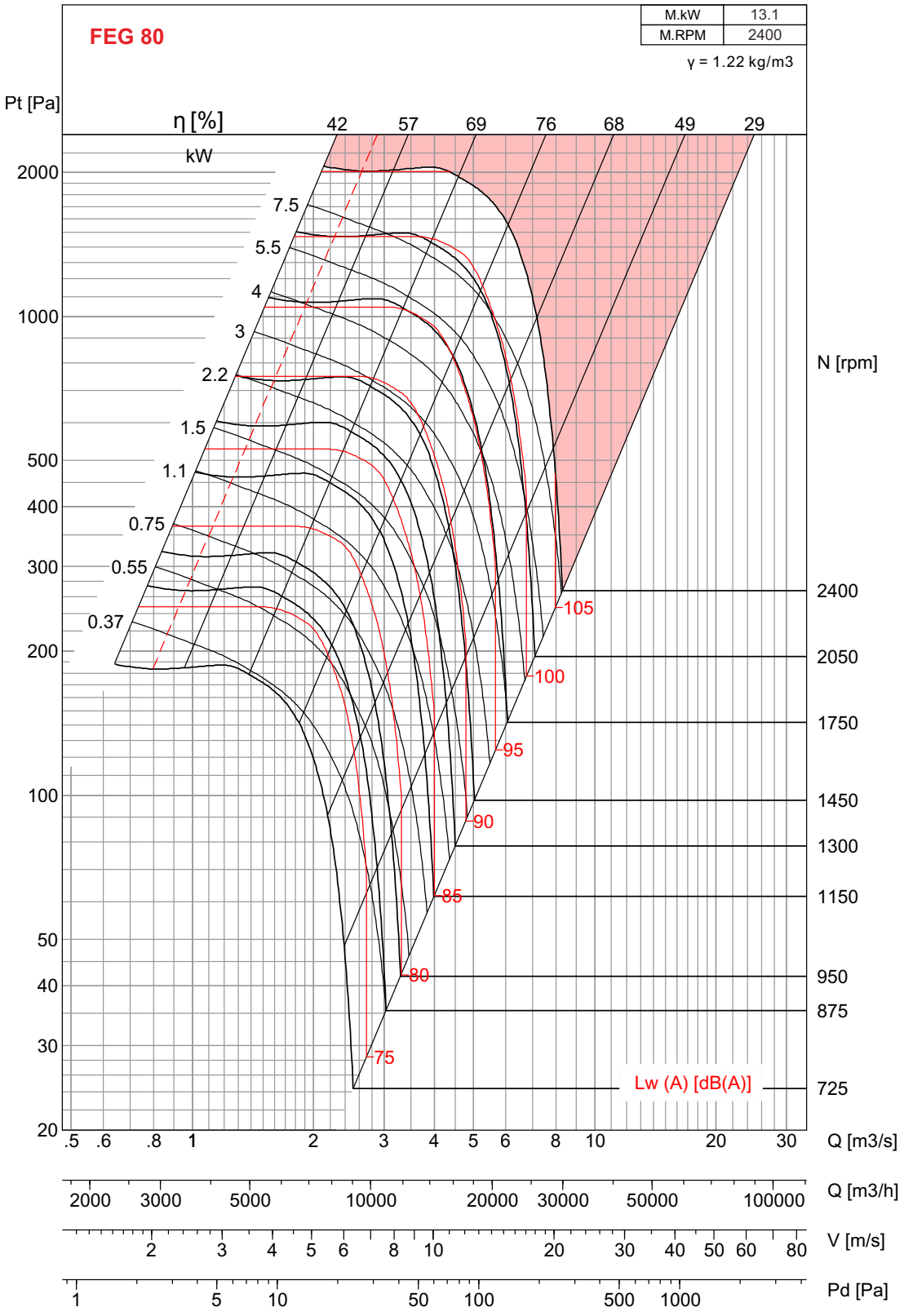
MXC 710



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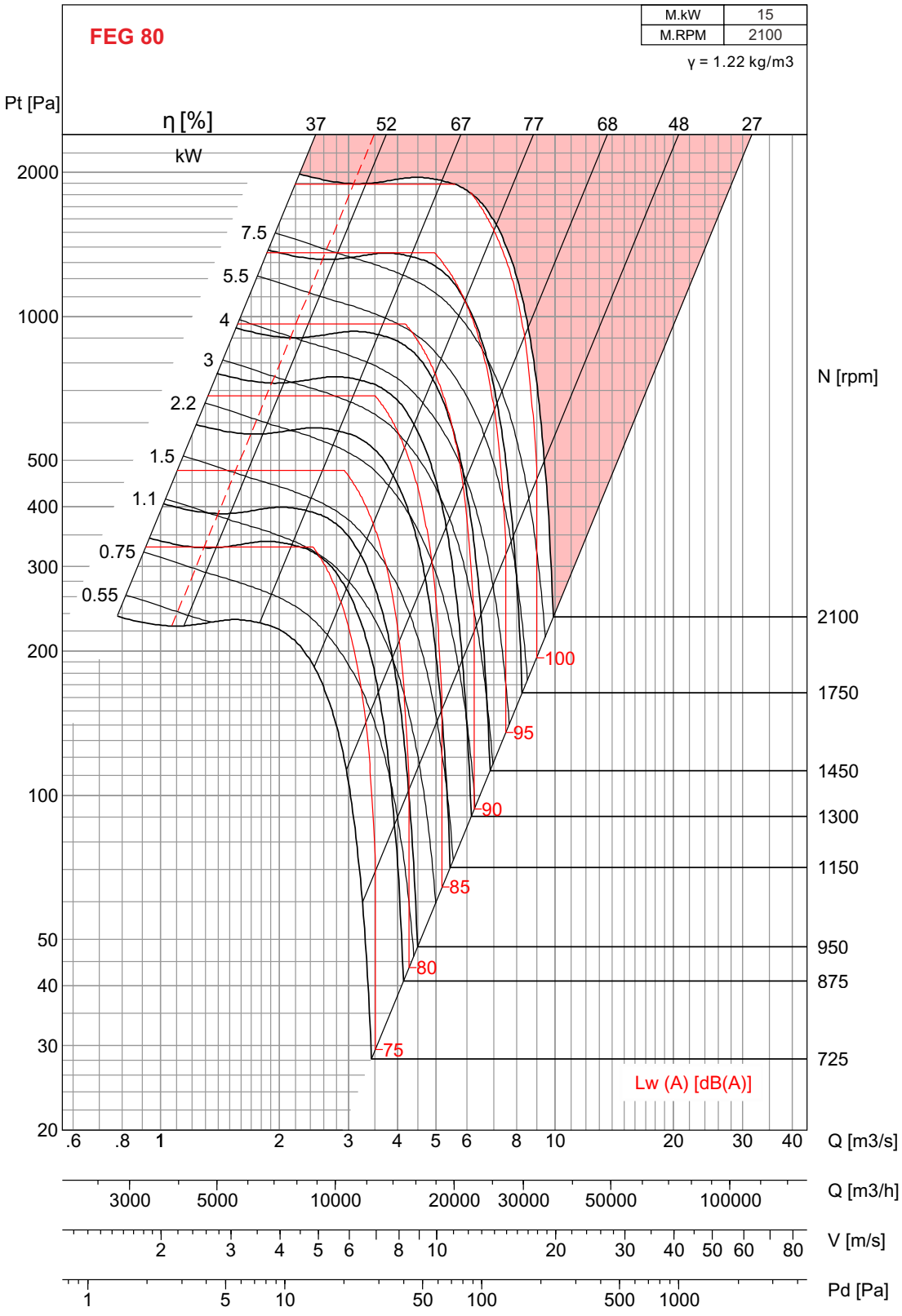
MXC 800



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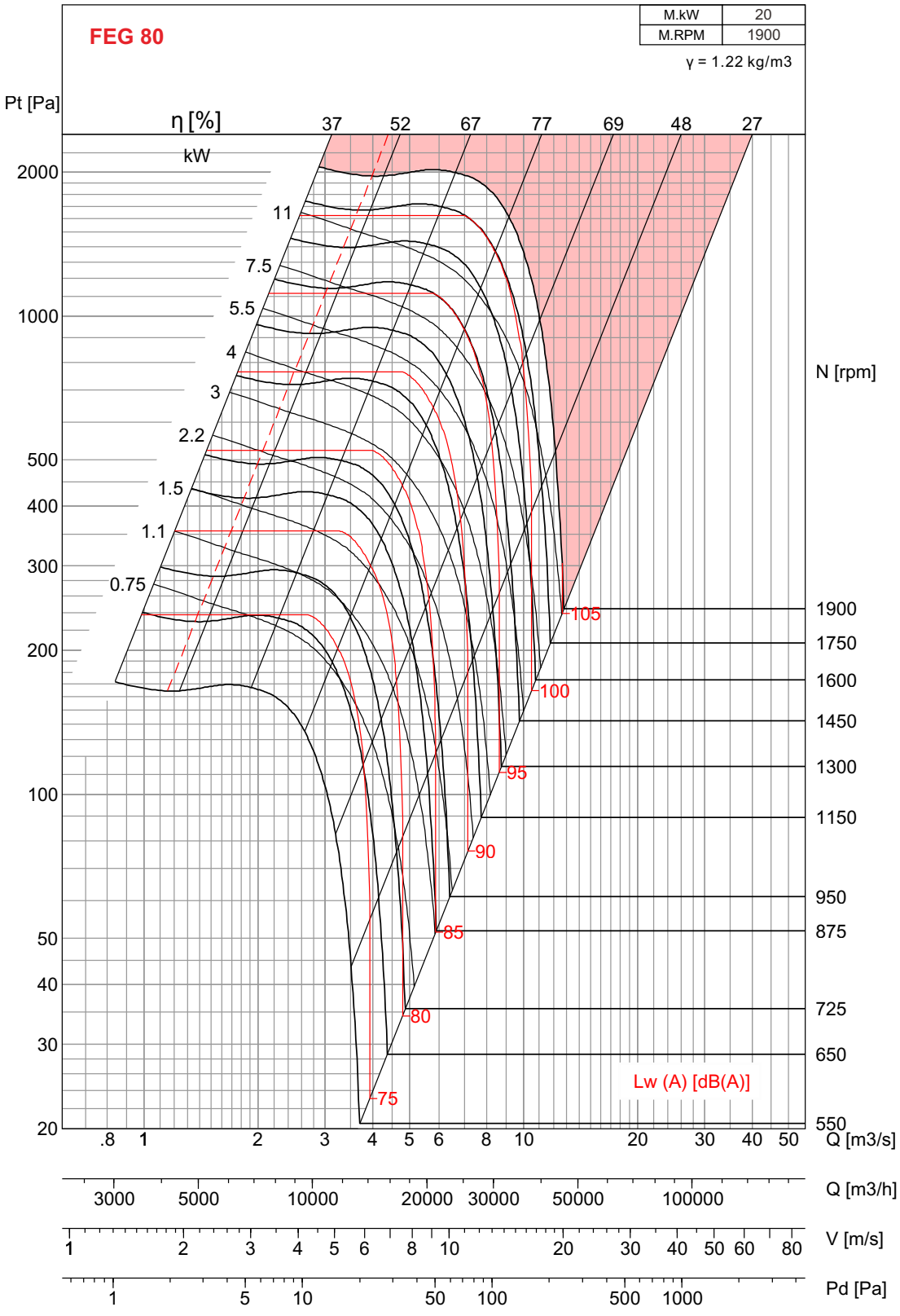
MXC 900



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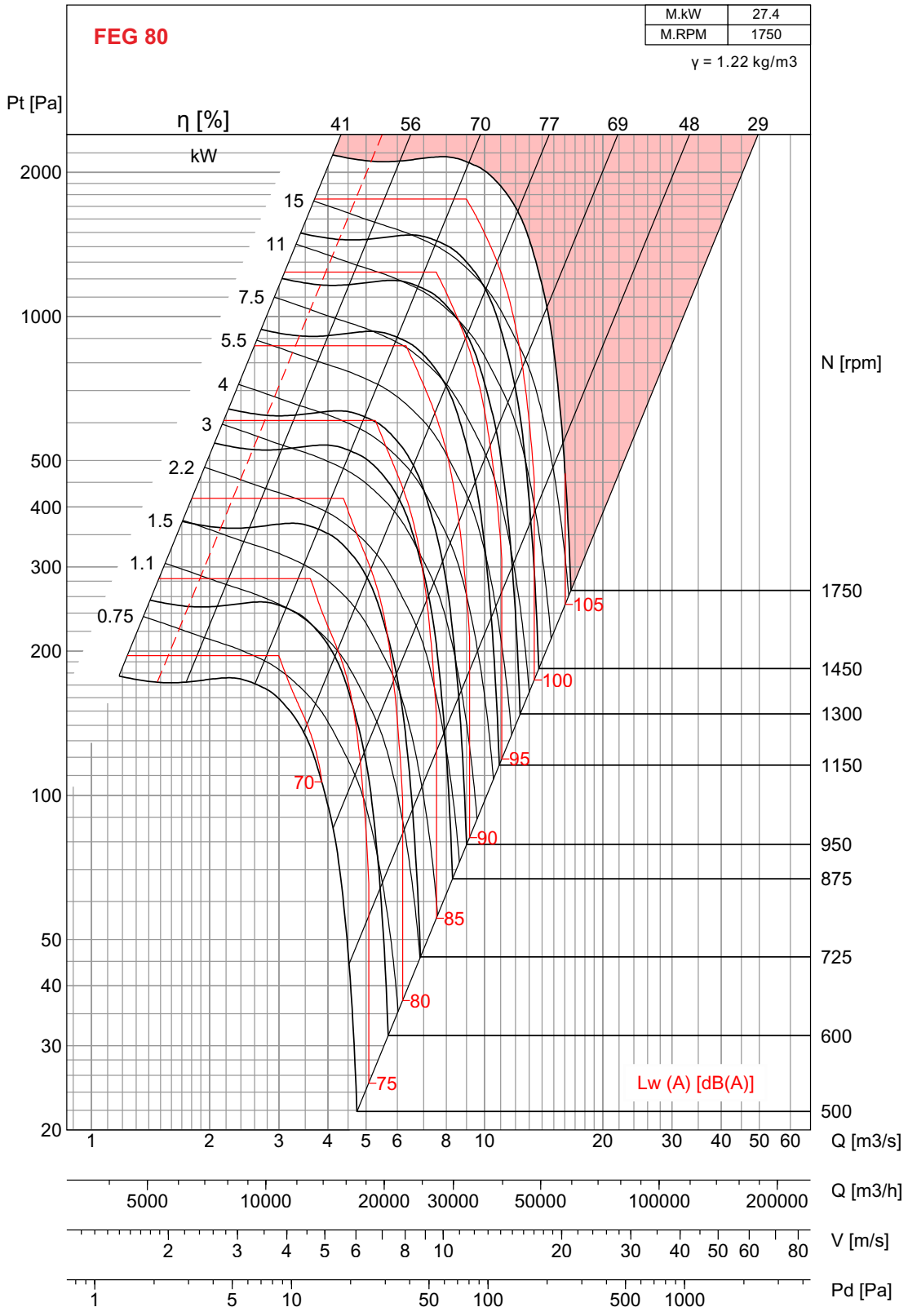
MXC 1000



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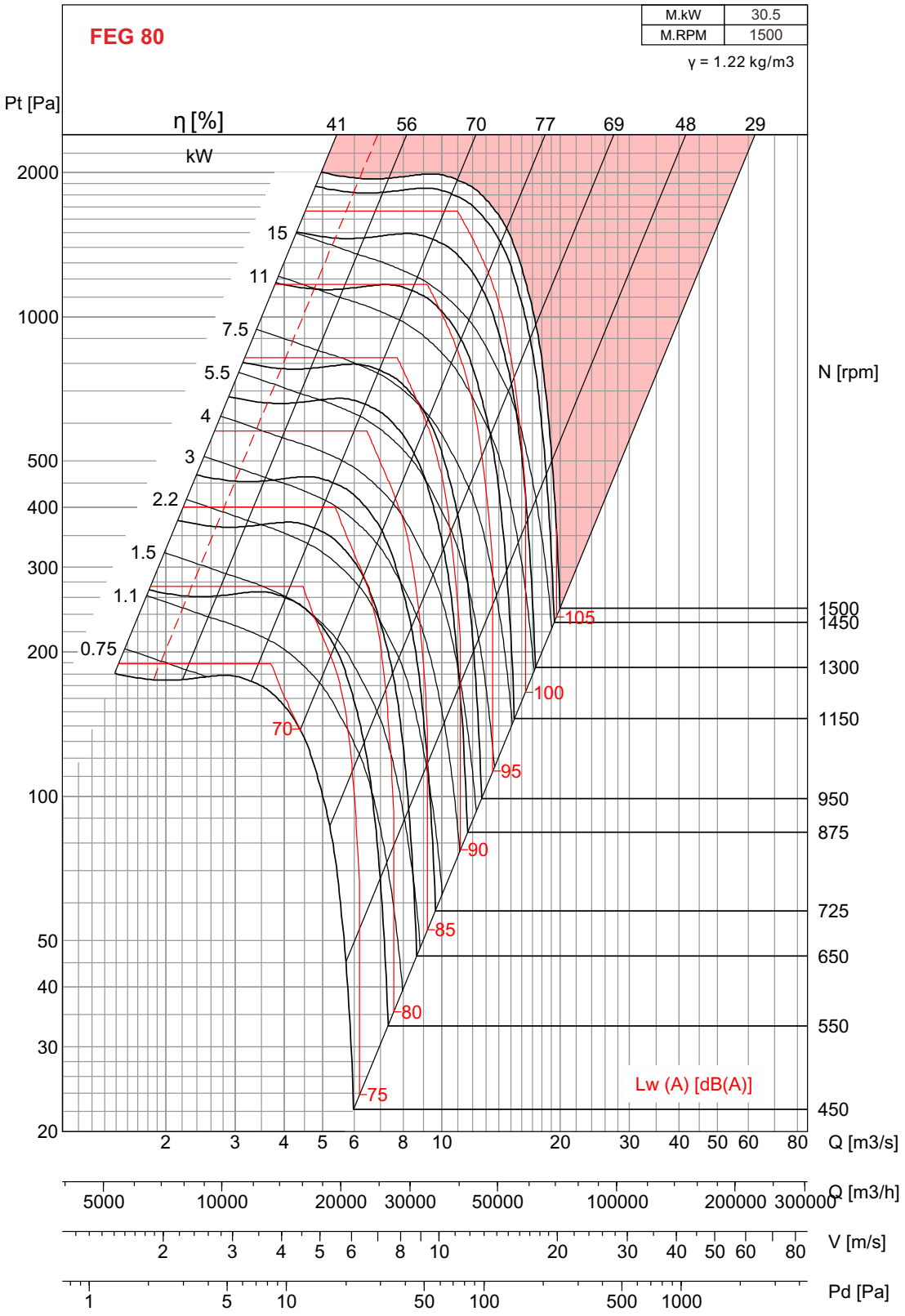
MXC 1120



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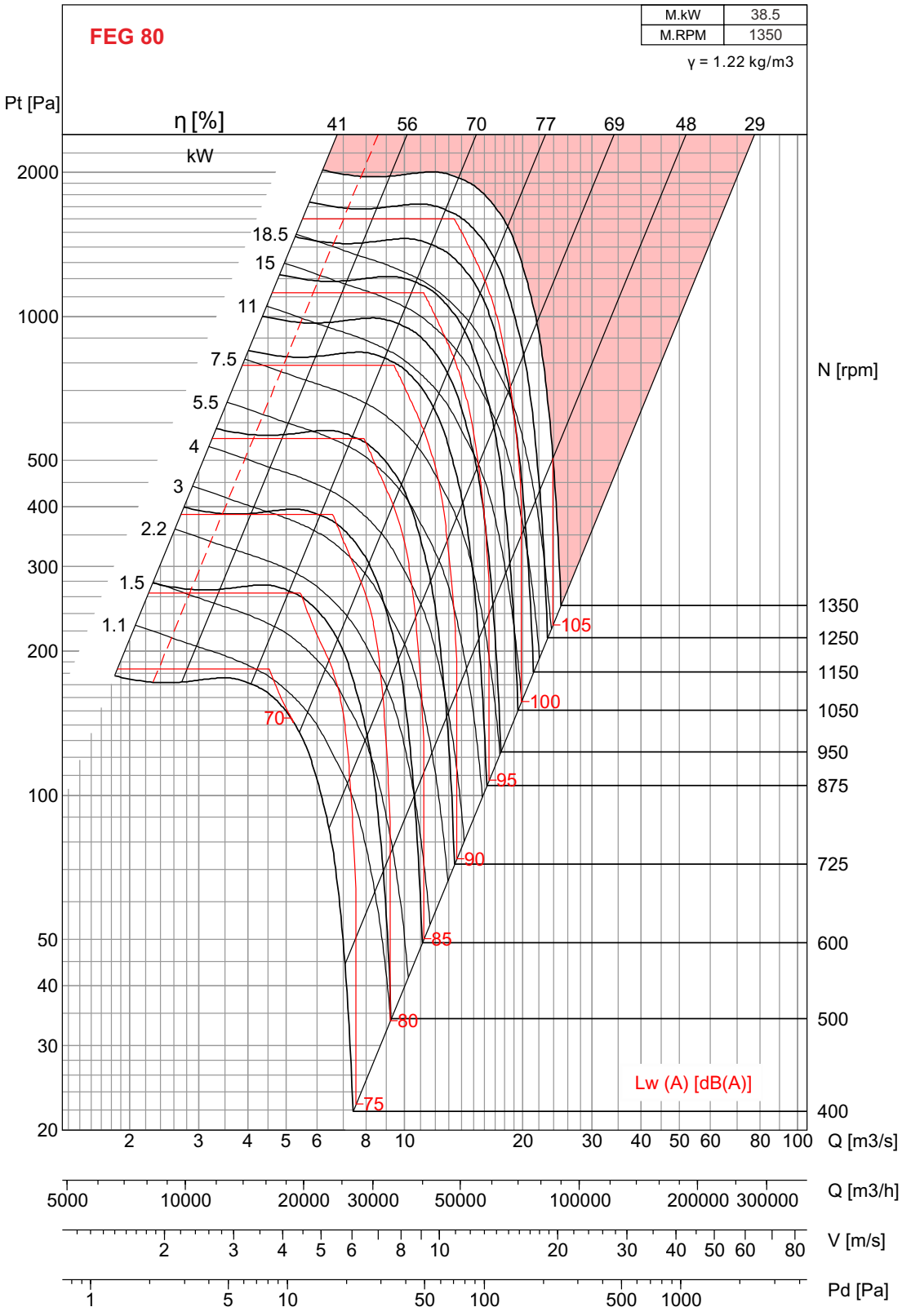
MXC 1250



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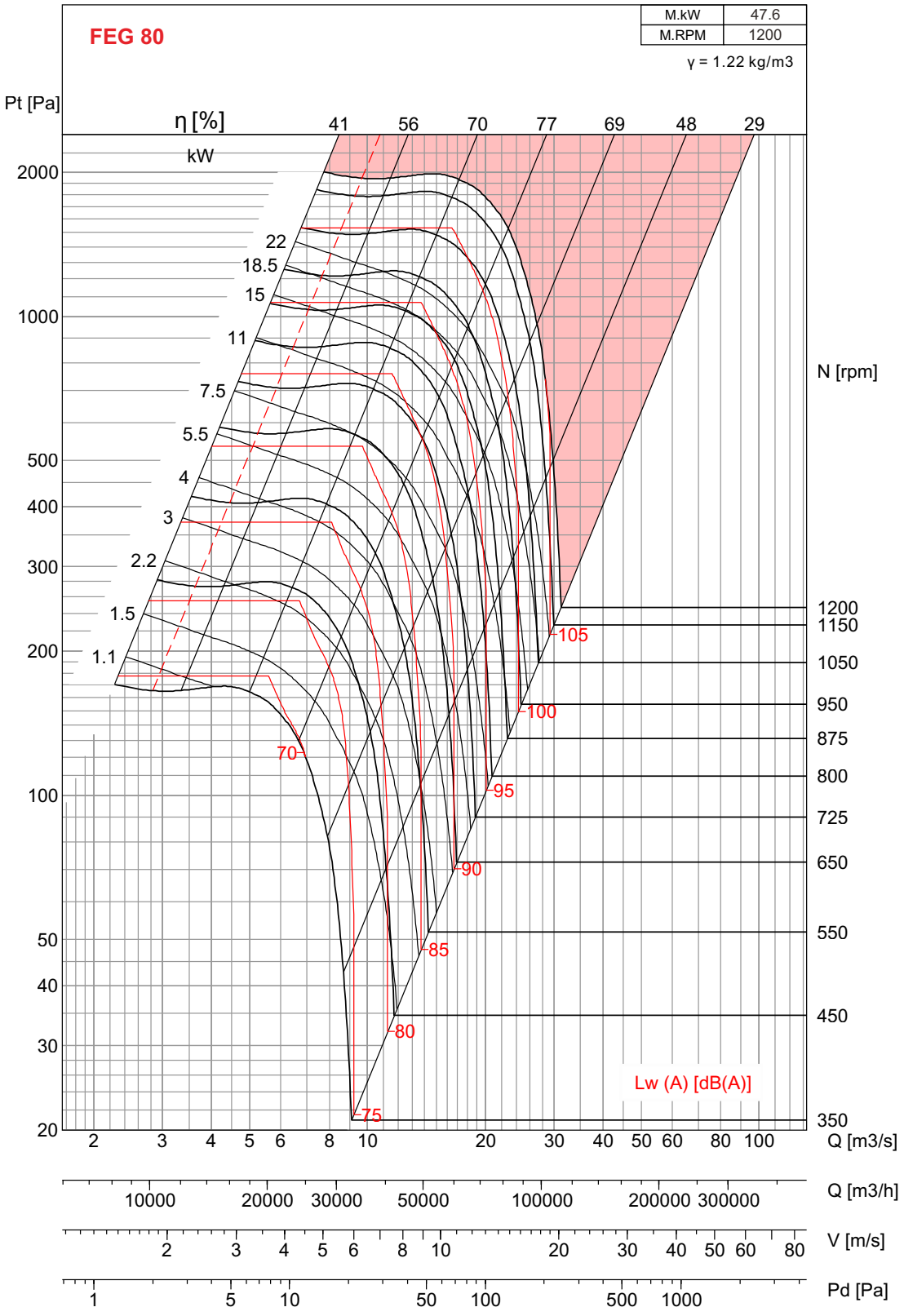
MXC 1400



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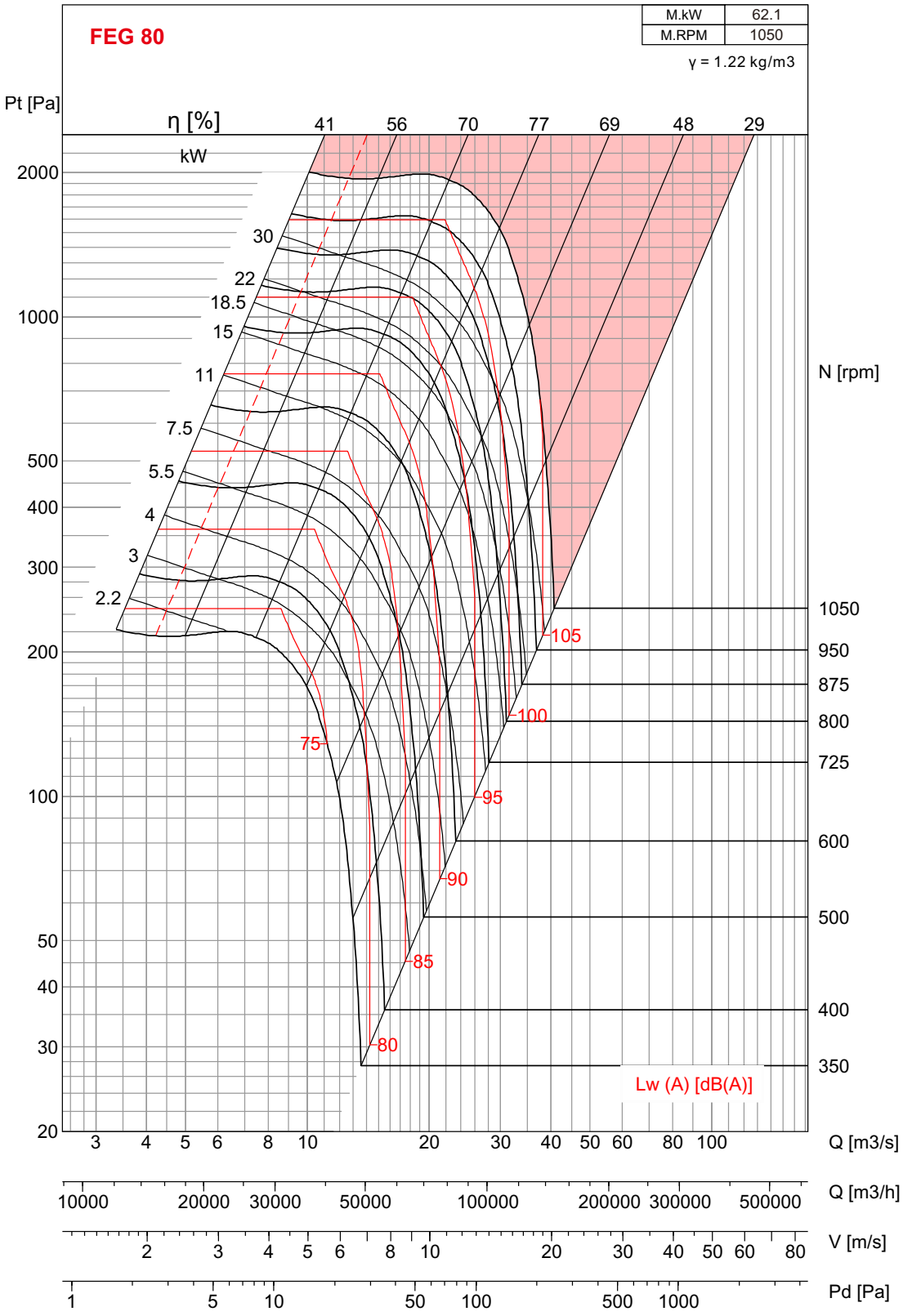
MXC 1600



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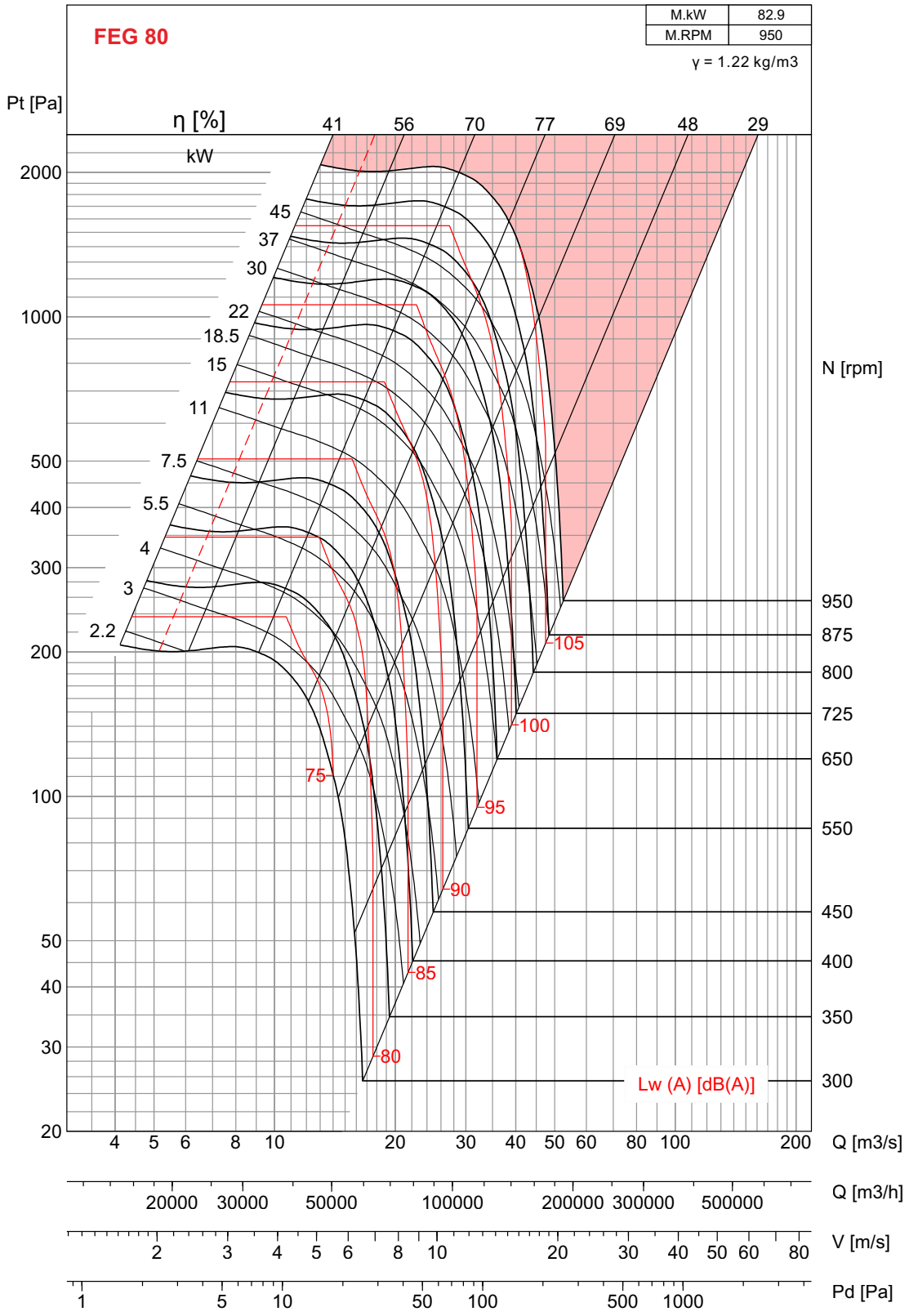
MXC 1800



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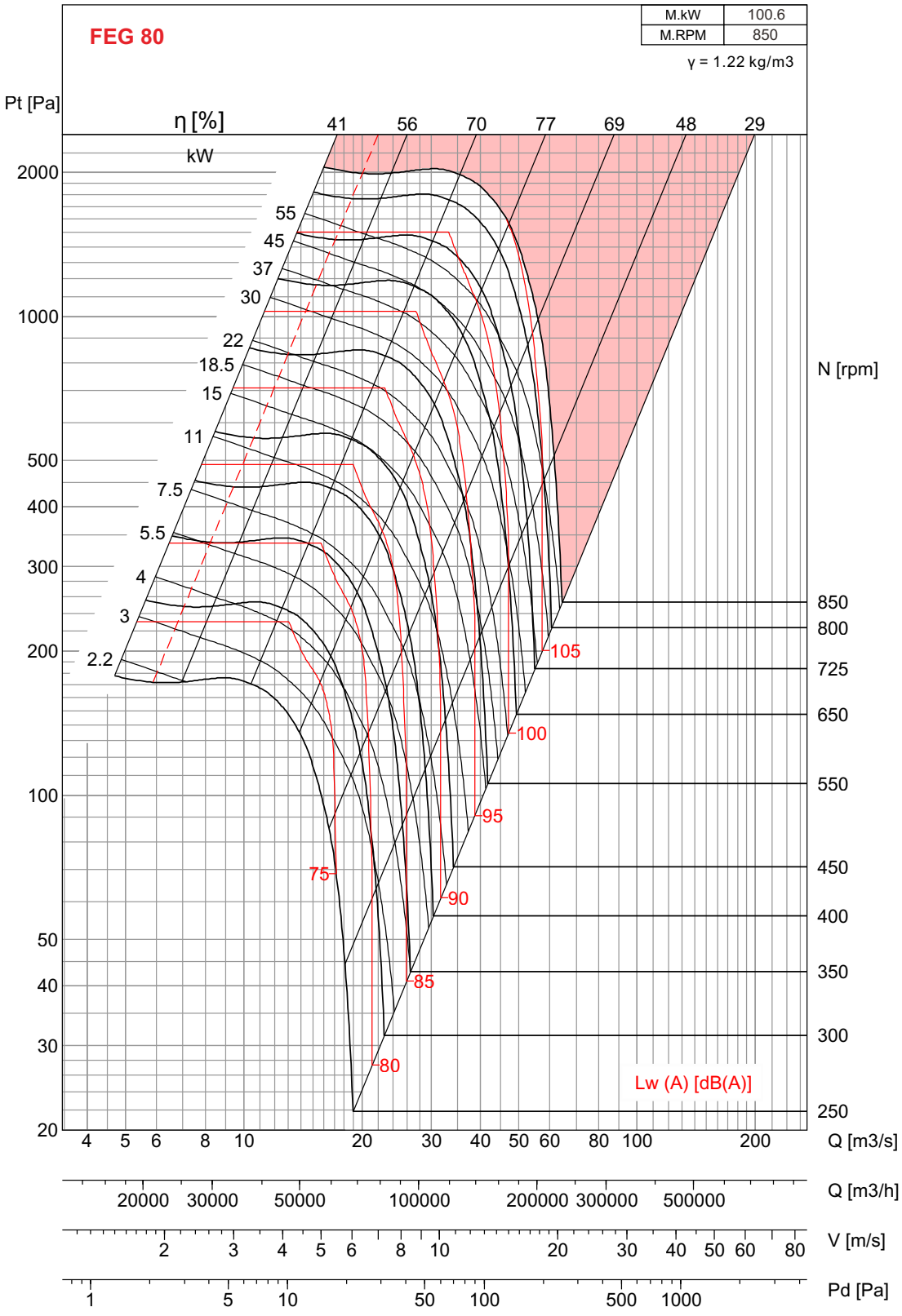
MXC 2000



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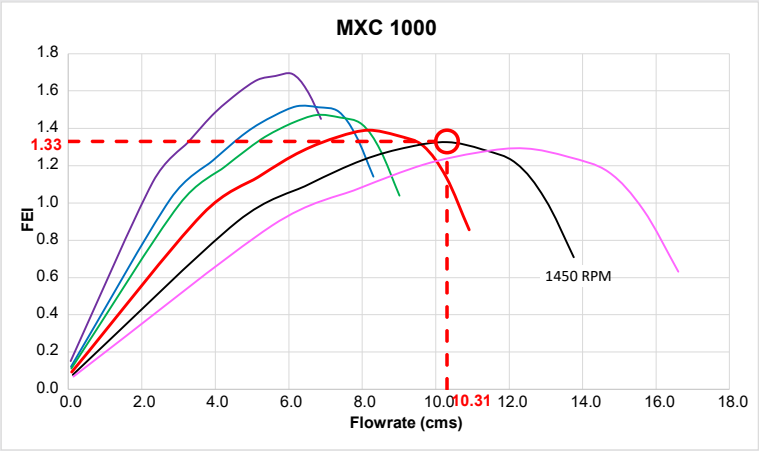
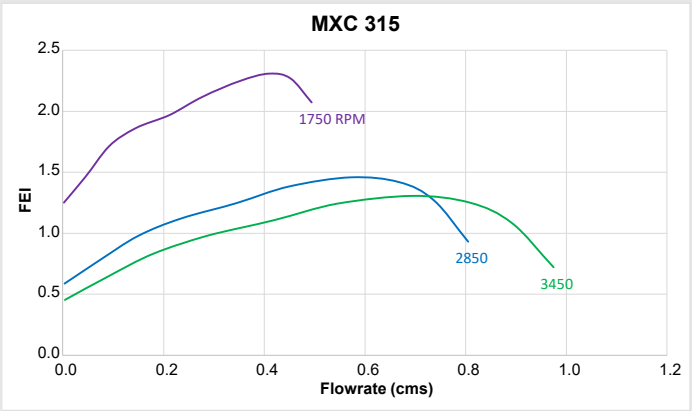
Fan Energy Inex

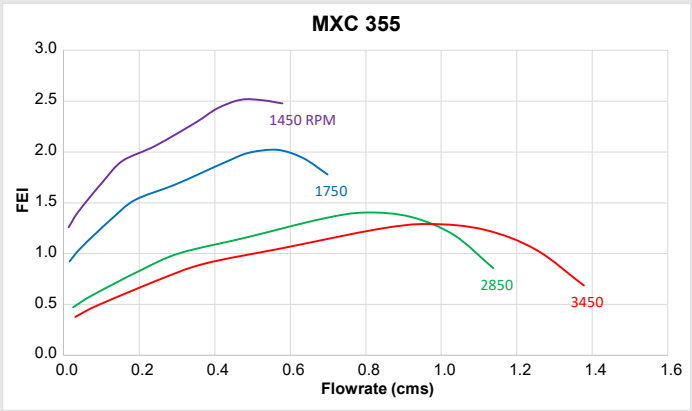
Example of FEI Selection

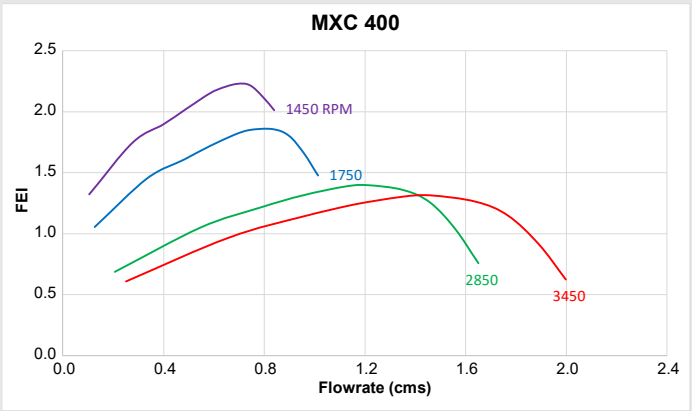
Air Volume	Q	=	10.31 m^3/s
Fan Speed	N	=	1450 rpm
FEI		=	1.33

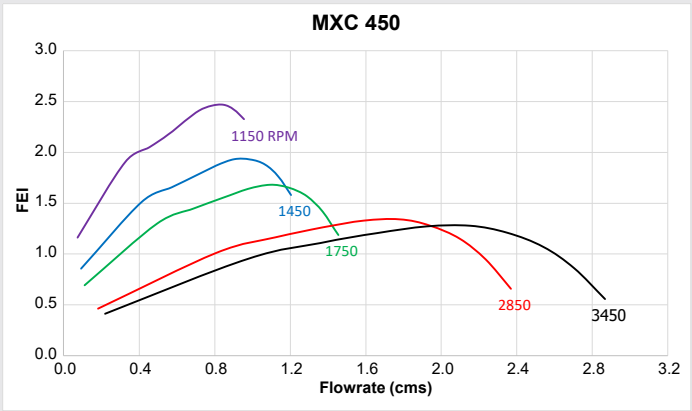


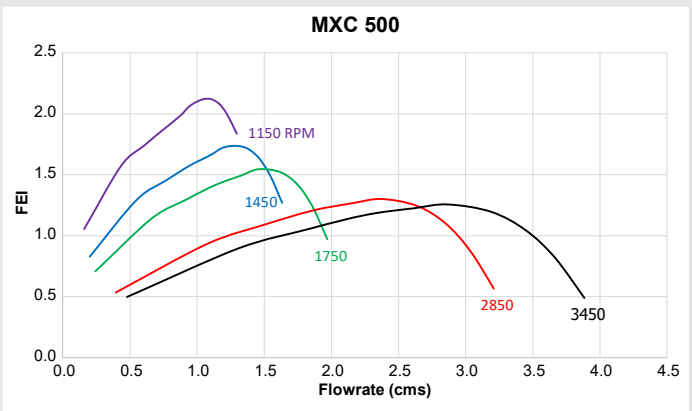
Direct Driven Fans

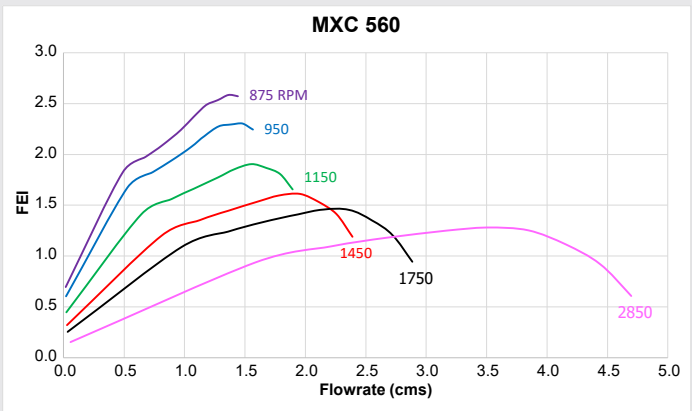












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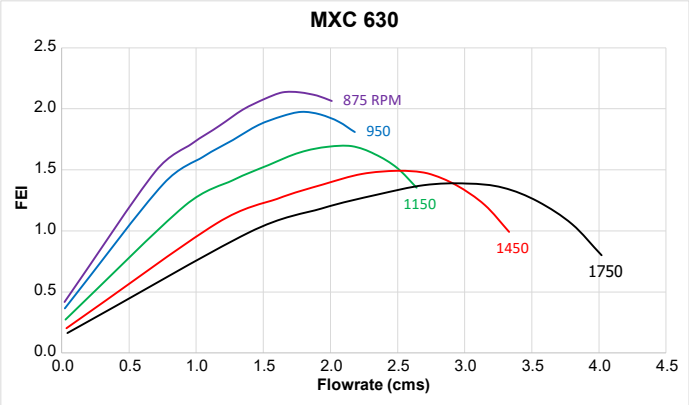

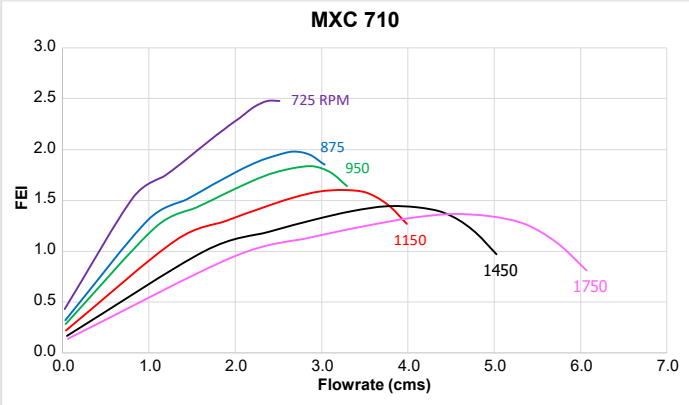

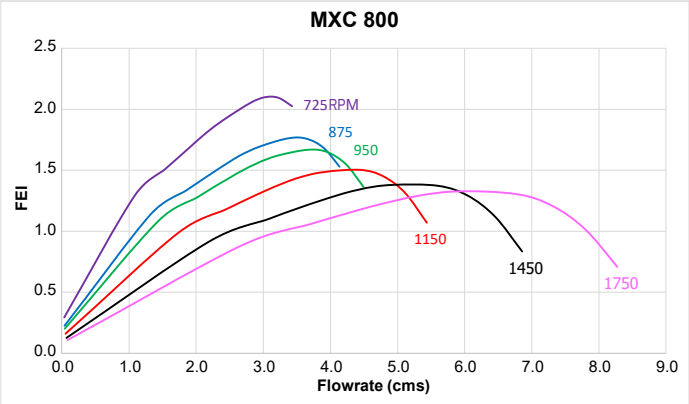

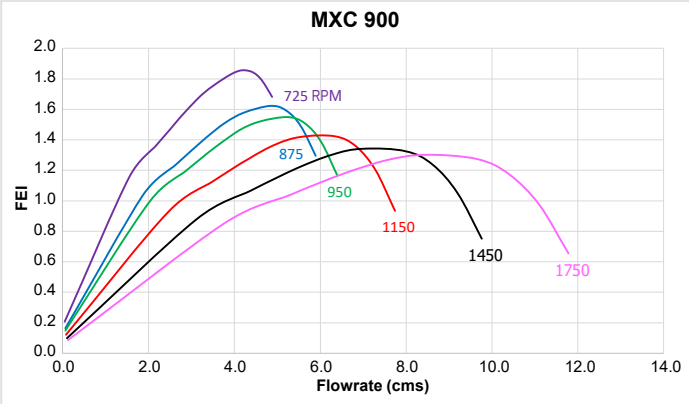

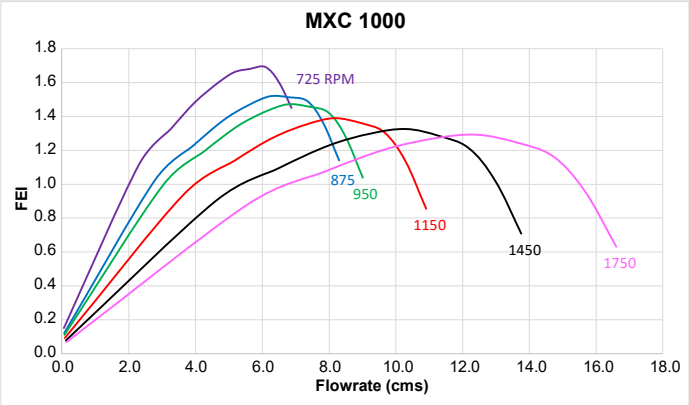

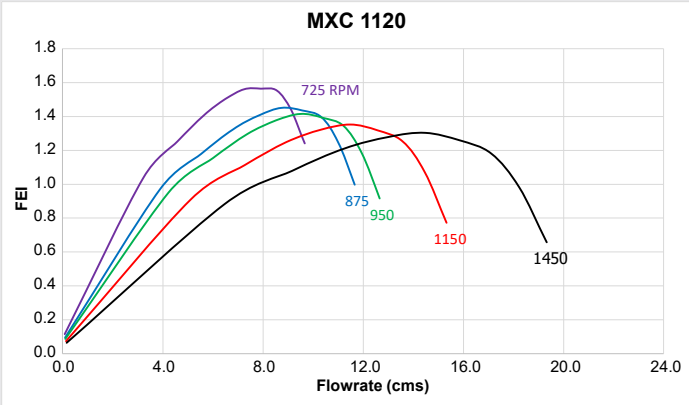

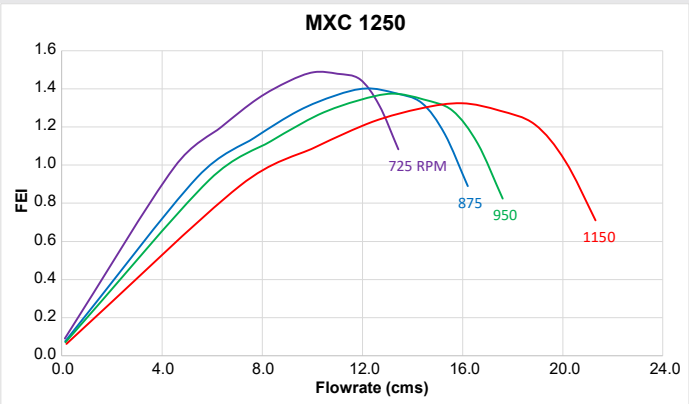

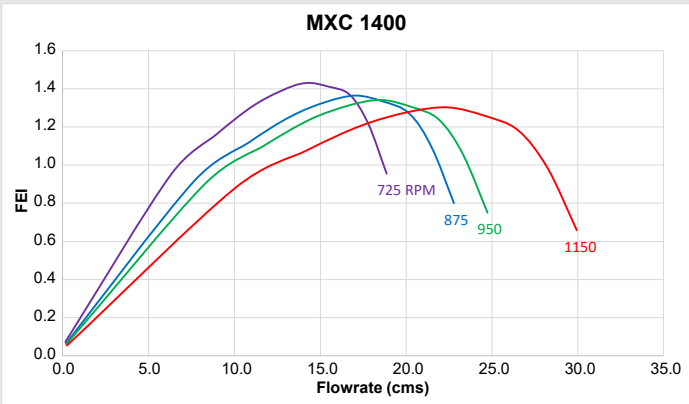

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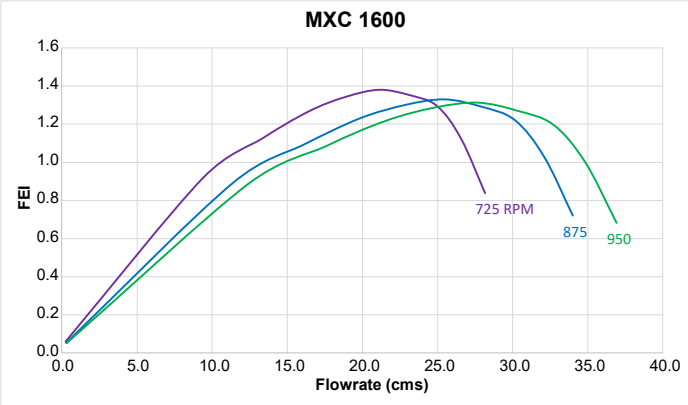

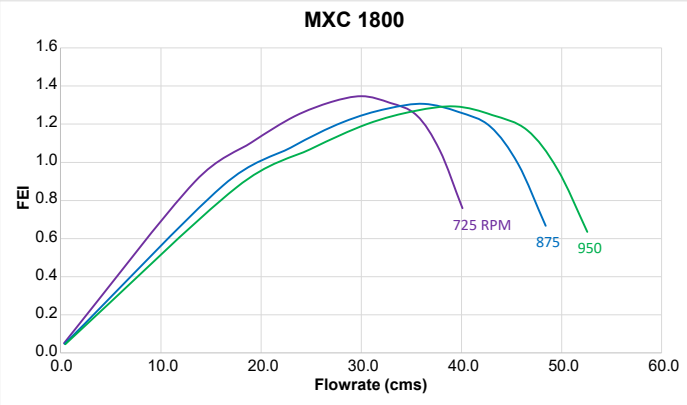

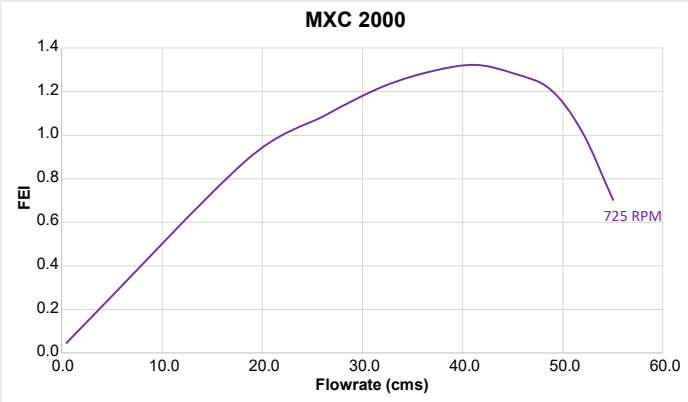

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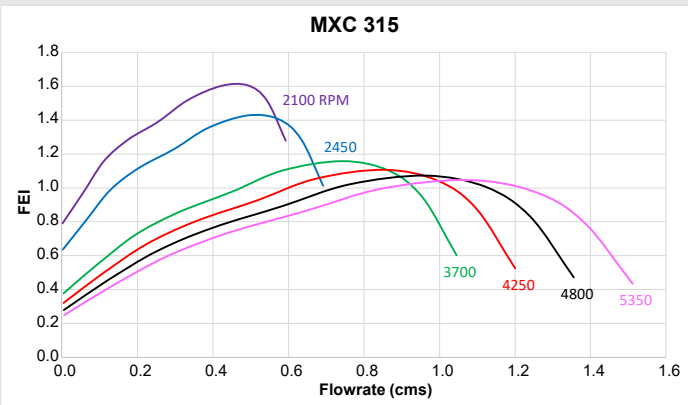
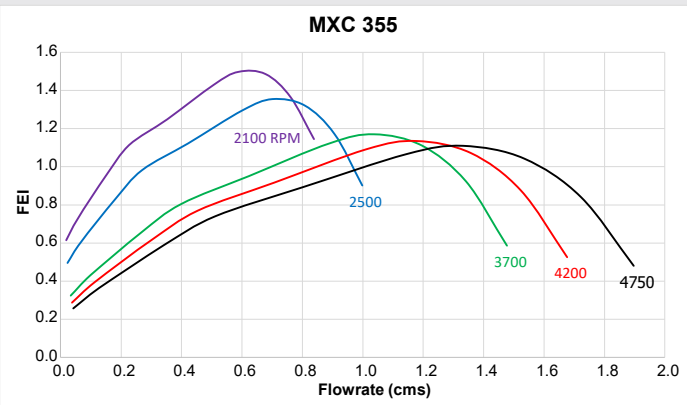
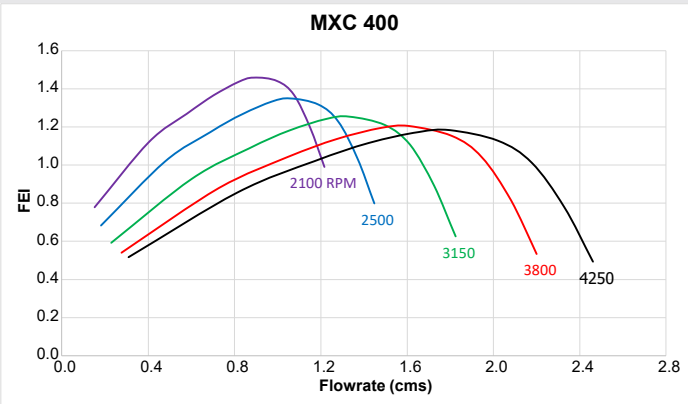
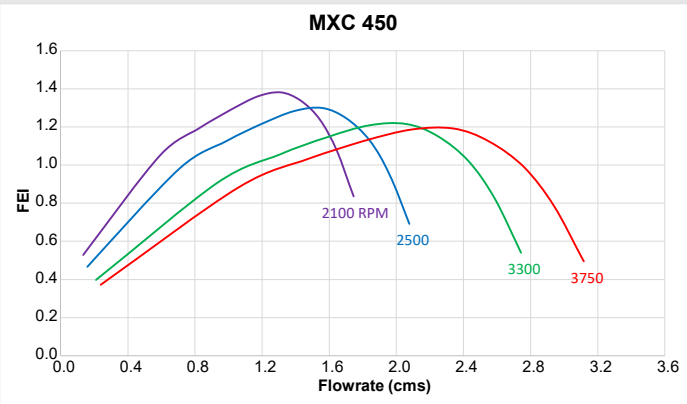
Belt Driven Fans









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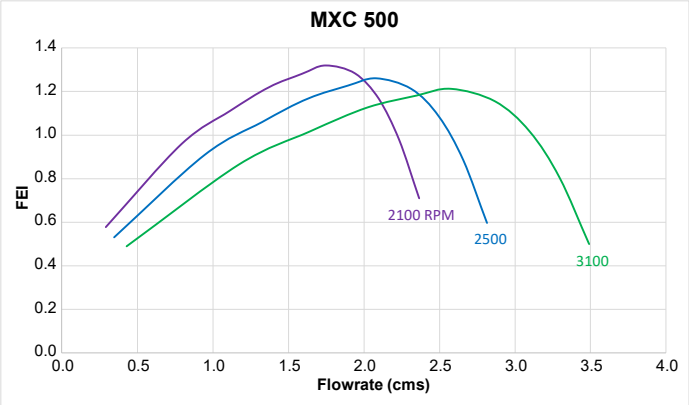

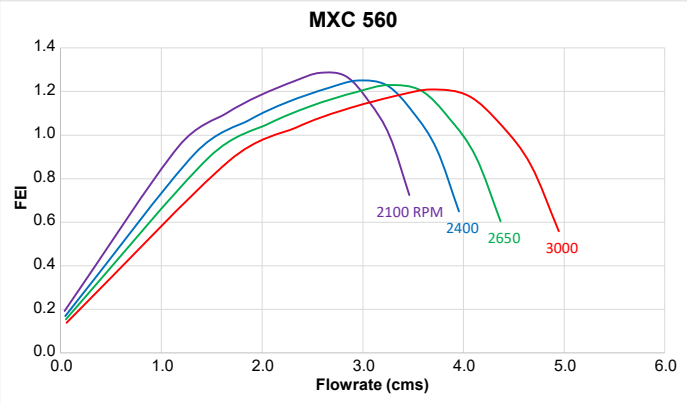

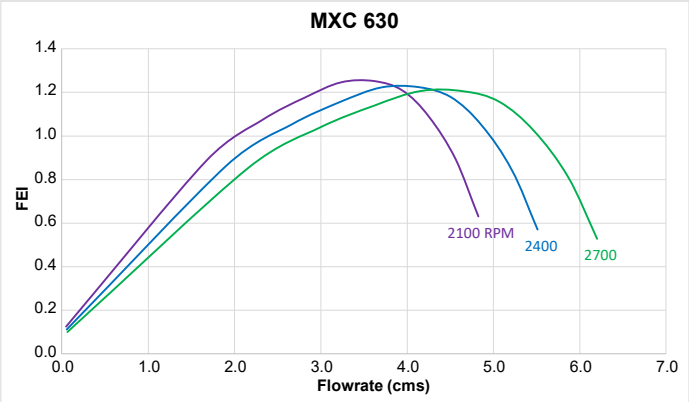

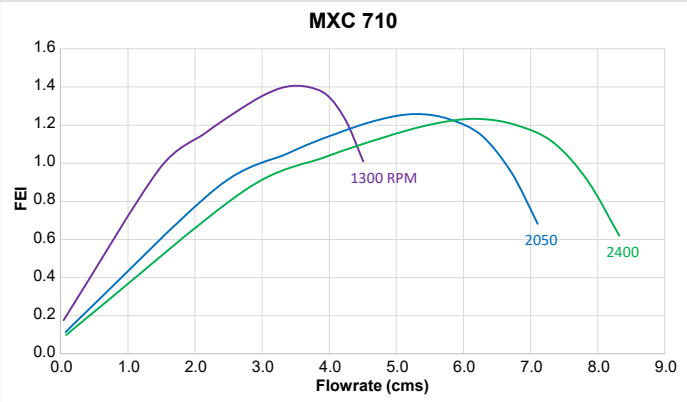

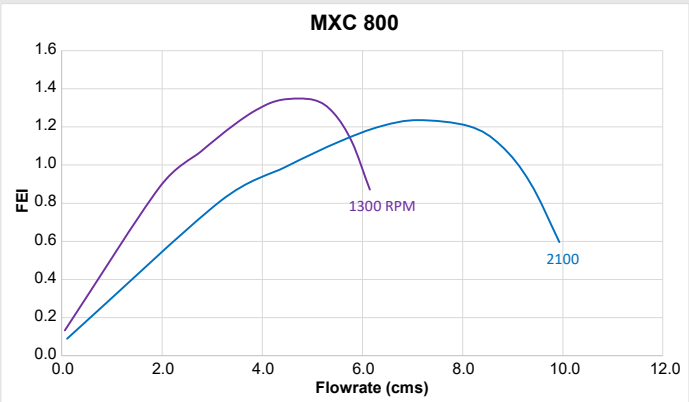

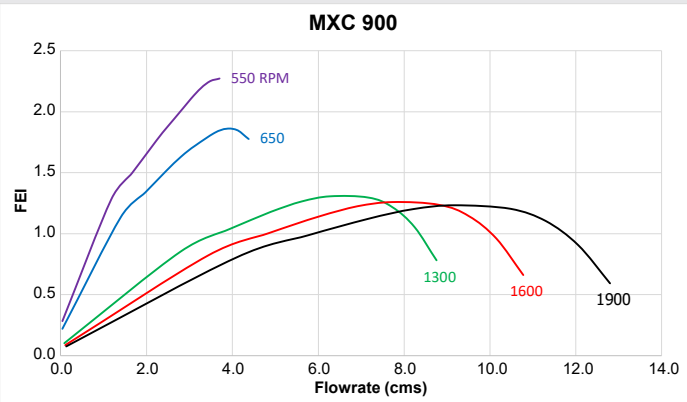

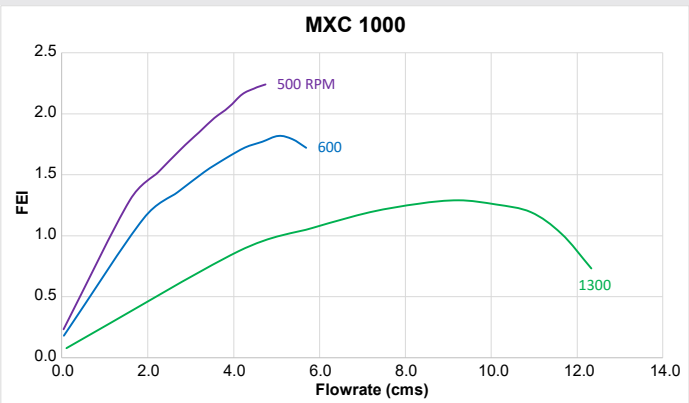

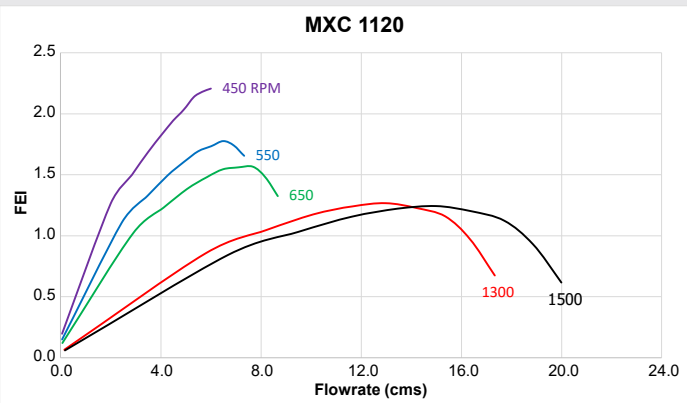

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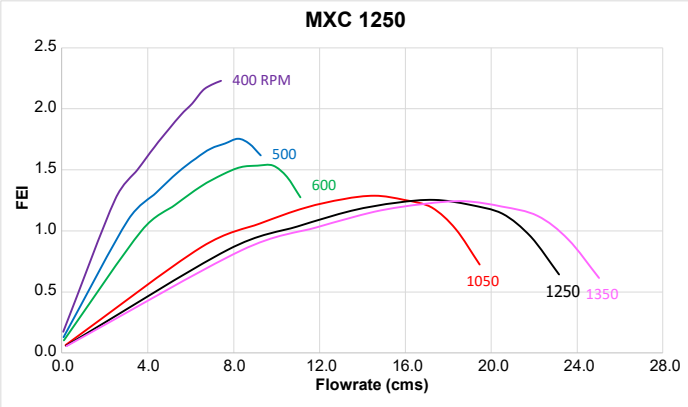

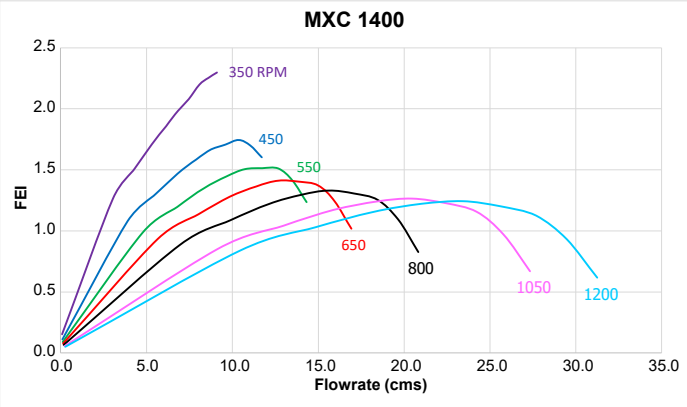

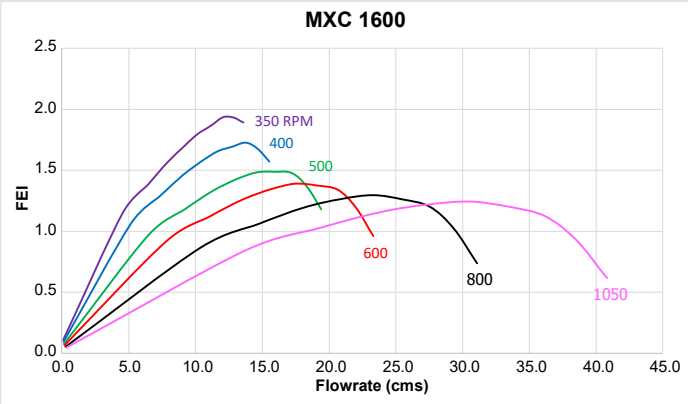

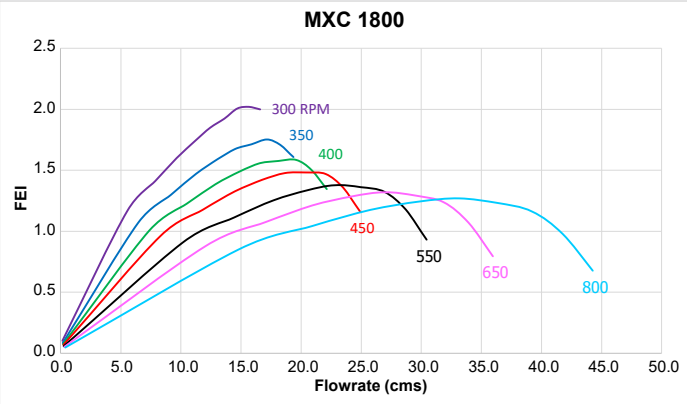

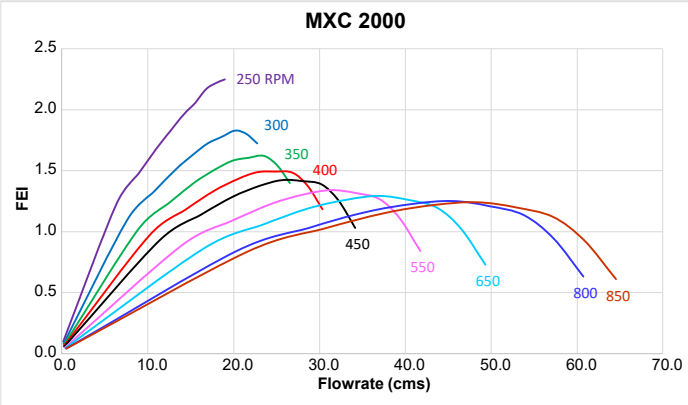

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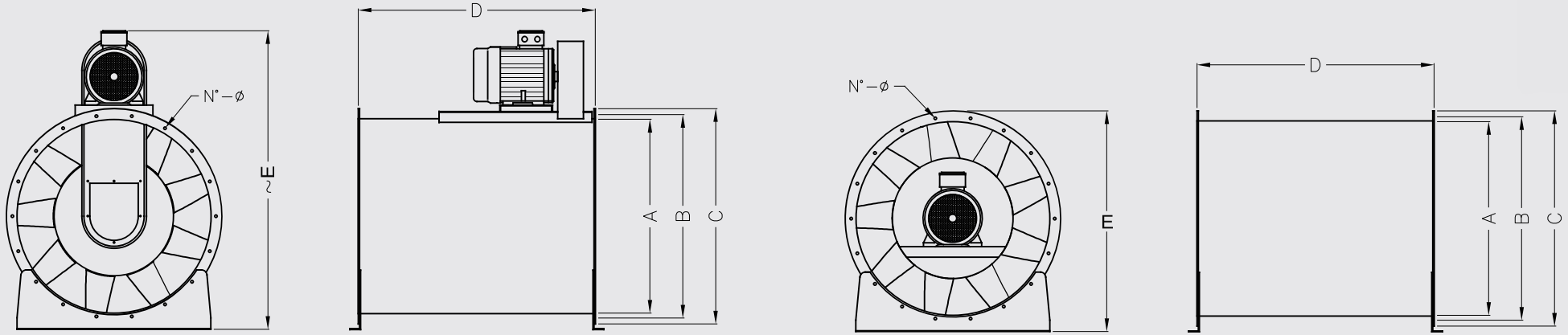
MXC Dimension Data



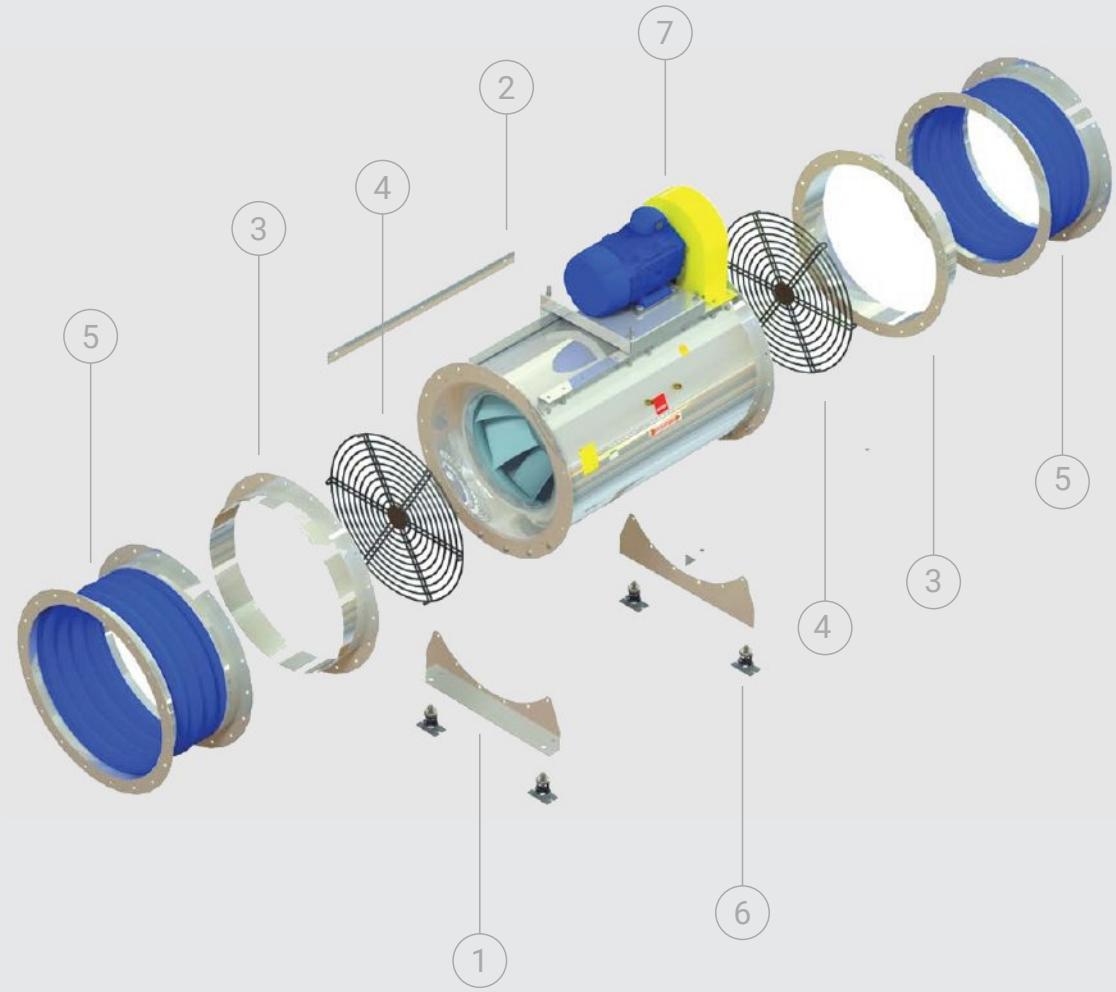
Model	A	B	C	D	E	N°	Ø	Weight* (kg)	Max Motor Frame Size**	Moment of Inertia of Wheel (kgm^2)
315	315	355	395	500	600	8	10	36	90	0.023
355	355	395	435	560	650	8	10	44	100	0.040
400	400	440	480	630	720	12	10	53	112	0.065
450	450	490	530	630	765	12	10	60	112	0.102
500	500	540	580	710	890	12	10	78	112	0.190
560	560	605	660	800	990	12	10	101	132	0.315
630	630	675	730	900	1065	12	10	125	160	0.525
710	710	755	810	1000	1245	18	12	195	160	0.961
800	800	845	900	1000	1256	18	12	225	160	1.75
900	900	945	1000	1100	1395	18	12	273	180	3.17
1000	1000	1050	1100	1250	1515	24	12	360	200	4.98
1120	1120	1186	1250	1400	1665	24	12	460	225	7.60
1250	1250	1315	1380	1400	1845	24	12	702	225	14.23
1400	1400	1465	1530	1600	2120	32	14	786	250	23.93
1600	1600	1663	1730	1800	2445	32	14	899	280	39.8
1800	1800	1256	1930	2240	2675	32	14	1011	315	75.4
2000	2000	2073	2130	2240	3005	32	14	1123	315	119.5

Model	A	B	C	D	E	N°	Ø	Weight* (kg)	Max Motor Frame Size*
315	315	355	395	500	406	8	10	32	71
355	355	395	435	560	455	8	10	40	71
400	400	440	480	630	502	12	10	48	80
450	450	490	530	630	553	12	10	55	90
500	500	540	580	710	608	12	10	71	100
560	560	605	660	800	680	12	10	92	112
630	630	675	730	900	805	12	10	115	132
710	710	755	810	1000	837	18	12	184	132
800	800	845	900	1000	926	18	12	214	160
900	900	945	1000	1100	1026	18	12	261	180
1000	1000	1050	1100	1250	1130	24	12	347	200
1120	1120	1186	1250	1400	1230	24	12	443	225
1250	1250	1315	1380	1400	1412	24	12	682	250
1400	1400	1465	1530	1600	1562	32	14	764	280
1600	1600	1663	1730	1800	1790	32	14	873	315
1800	1800	1256	1930	2240	2005	32	14	982	315
2000	2000	2073	2130	2240	2220	32	14	1091	315

* Weight without motor

** Please consult KRUGER for motor frame size other than specified

All dimension in mm.



ACCESSORIES

1.Mounting Feet

2.Hangers

3.Inlet and Outlet Flanges

Inlet and Outlet flange connections are available for applications requiring flanged duct connections.

4.Inlet and Outlet Protection Nets

Inlet and Outlet protection nets are available to protect personnel and prevent debris from entering the fan.

Protection nets are constructed of either expanded metal or wound spiral rings and are factory installed. Available in optional safety yellow.

5.Flexible Duct

The flexible duct provides a flexible connection between the fan and the attached ductwork. This flexible connection reduces the transmission of noise and vibration to the ductwork as well as allowing for slight misalignment and easy removal of the fan without disturbing the regid ductwork.

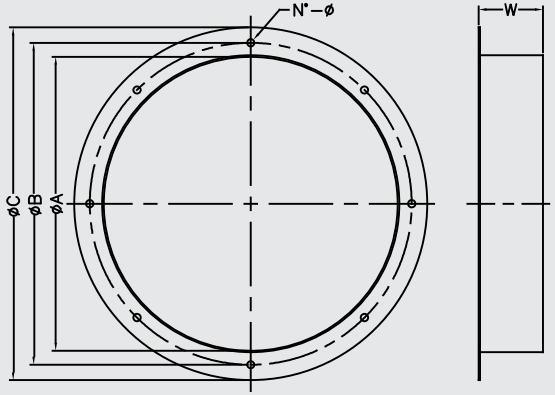
6.Spring Isolator

Spring isolators reduce unit vibration and noise. Both mounting and hanging isolator are available in either neoprene or spring mounts.

7.Belt Cover

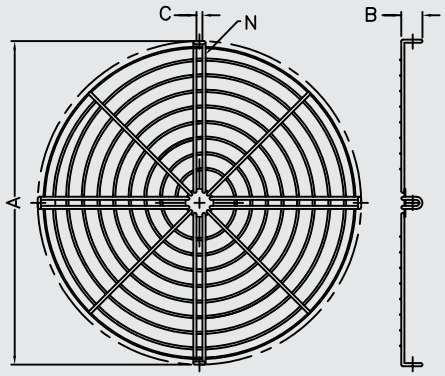
Belt cover isolates drive sets from airstream and protection from rotating pulleys and belts.

MXC Accessories Dimension Data



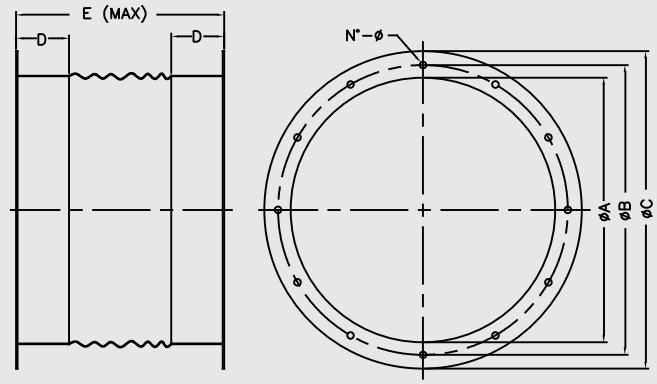
Inlet and Outlet Flanges

Model	A	B	C	W	N	ø
315	315	355	395	65	8	10
355	355	395	435	65	8	10
400	400	440	480	65	12	10
450	450	490	530	65	12	10
500	500	540	580	65	12	10
560	560	605	660	65	12	10
630	630	675	730	65	12	10
710	710	755	810	75	18	12
800	800	845	900	75	18	12
900	900	945	1000	75	18	12
1000	1000	1050	1100	75	18	12
1120	1120	1185	1250	85	24	12
1250	1250	1315	1380	85	24	12
1400	1400	1465	1530	85	32	14
1600	1600	1663	1730	85	32	14
1800	1800	1856	1930	95	32	14
2000	2000	2073	2130	95	32	14



Inlet and Outlet Protection Nets

Model	A	B	C	N
315	313	25	10	4
355	353	25	10	4
400	398	25	10	4
450	448	25	10	4
500	498	25	10	4
560	558	25	10	4
630	628	25	10	4
710	708	25	10	6
800	798	25	10	6
900	898	25	10	6
1000	998	25	10	8
1120	1118	25	10	8
1250	1248	25	10	8
1400	1398	25	10	8
1600	1598	25	10	8
1800	1798	25	10	8
2000	1998	25	10	8



Flexible Duct

Model	A	B	C	D	E	N	ø
315	315	355	395	40	220	8	10
355	355	395	435	40	220	8	10
400	400	440	480	40	220	12	10
450	450	490	530	40	220	12	10
500	500	540	580	40	220	12	10
560	560	605	660	40	220	12	10
630	630	675	730	40	220	12	10
710	710	755	810	40	220	18	12
800	800	845	900	40	220	18	12
900	900	945	1000	40	220	18	12
1000	1000	1050	1100	40	220	18	12
1120	1120	1185	1250	40	220	24	12
1250	1250	1315	1380	40	220	24	12
1400	1400	1465	1530	40	220	32	14
1600	1600	1663	1730	40	220	32	14
1800	1800	1856	1930	40	220	32	14
2000	2000	2073	2130	40	220	32	14

All dimension in mm.

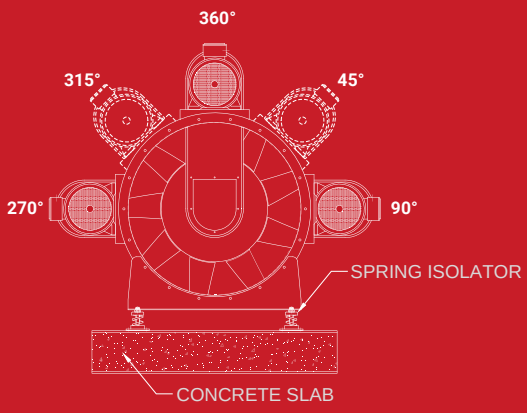
INSTALLATION & MOUNTING

Horizontal Mounting

Horizontal mounting configurations are provided with a standard support for both ceiling and floor applications. The mounting configurations and the motor position can be changed in the field. Lifting lugs are provided to assist in the installation.

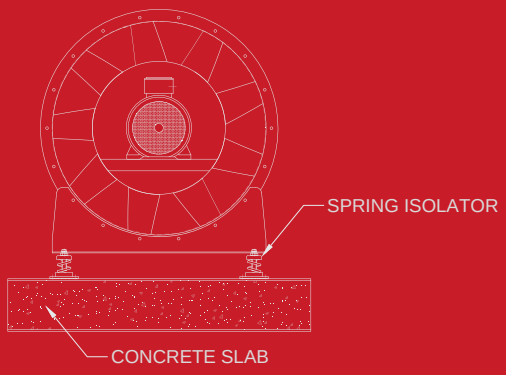
ARRANGEMENT 9

Belt Driven, Floor Type

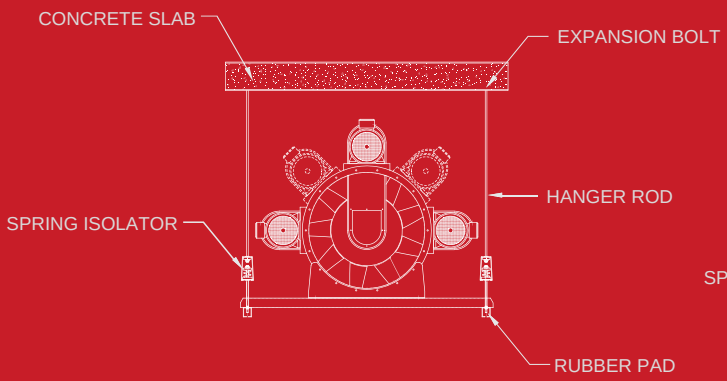


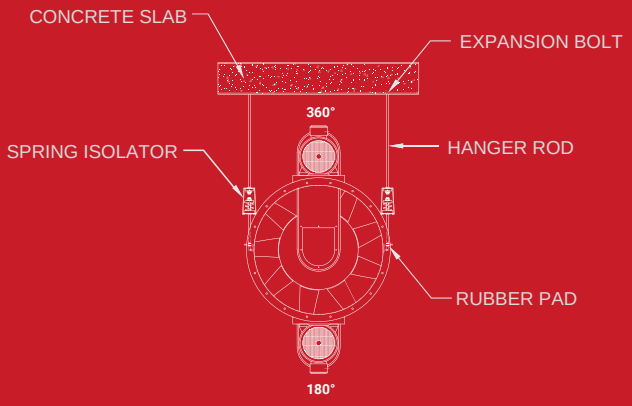
ARRANGEMENT 4

Direct Driven, Floor Type

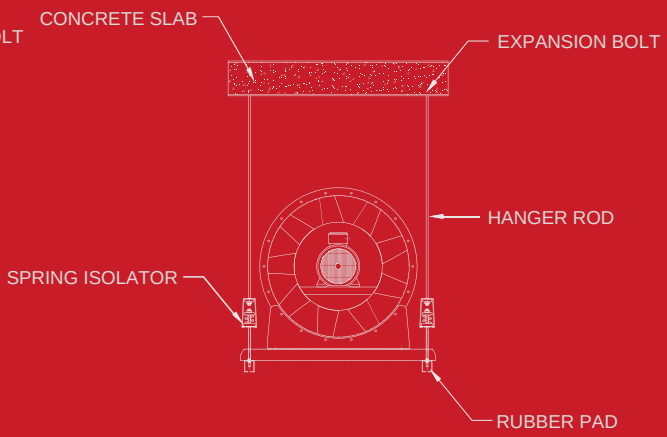


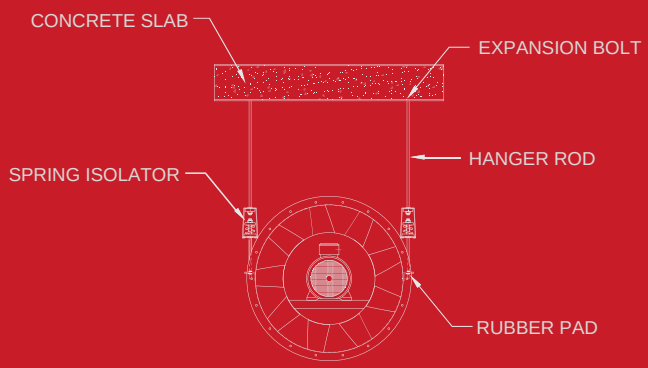
Belt Driven, Ceiling Type





Direct Driven, Ceiling Type





Smoke Spill Fan

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