E-SERIES PLUG TYPE
PLENUM FANS

EPF | EPFN | EPQ | EPQN
Twin City Fan & Blower certifies that the Model EPF, EPFN, EPQ & EPQN Plenum 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. Refer to Catalogue 475 for sound power levels.

E-Series

EPF | EPFN | EPQ | EPQN

Twin City Fan & Blower, the world's largest supplier of plug type plenum fans, now offers the completely redesigned E-Series, the first plug type plenum fan to be AMCA approved for sound and air in both Arrangement 1 and 3 configurations.

The E-Series offers the flexibility of two plug type plenum fan designs, with each model offering its own unique performance characteristics. While every E-Series fan is highly efficient and quiet, you can choose an E-Series design option that optimises the performance requirements most important to your application.

Benefits of a Plug Type Plenum Fan

Saves Space – There are no housings, transitions, or diffusers within the air handling unit.

Efficiency – Plug type plenum fans can be as efficient, or more efficient than scroll type fans at specific operating points towards the bottom of the fan curve.

Lower cost – Plug type plenum fans are less expensive than many scroll type fans.

Compact Designs with Performance Assurance

Space is often a key consideration in the selection of plug type plenum fans, making the compact Arrangement 3 configuration very popular.

The Arrangement 3 configuration is constructed with a bearing and bearing bar in the inlet, which will affect fan performance. These performance affects should be taken into account to ensure that your system functions as designed.

Plug type plenum fans are un-housed fans designed to operate inside of field-fabricated or factory-built air handling units.

Application

The fan impeller pressurizes the entire surrounding air plenum in which the fan is installed, allowing air ducts from any direction to be directly connected to the air handling unit enclosure. This design generally saves space by eliminating the fan housing, transitions, and diffusers within the air handling unit.

Plug type plenum fans have found a ready acceptance in the air conditioning industry. In addition, the construction versatility, adaptability in the direction of the discharges, suitability for internal isolation and application of sound attenuators, and generally lower cost makes it a very popular fan arrangement.
9-Bladed Impellers

EPF (Arr. 3)
The model EPF features a highly efficient and cost effective, nine-bladed aerofoil impeller design. The high efficiency of the EPF will often allow the use of smaller fans without increasing power requirements. The EPF is an Arrangement 3 design.

EPFN (Arr. 1 and 4)
The model EPFN features the same highly efficient, nine-bladed aerofoil impeller design as the EPF, but is available in Arrangement 1 or 4 designs without inlet obstructions.

Sizes
315 mm to 1850 mm impeller diameters

Performance
Airflow from 0.5 to 80 m³/sec
Static pressure to 2500 Pa

Drive Configurations
Available in both direct and belt drive configurations.

Construction
Class I, II, & III

12-Bladed Impellers

EPQ (Arr. 3)
The Better Sound Quality model EPQ features a twelve-bladed aerofoil impeller design that flattens the sound spectrum and reduces the dominance of pure tones. The EPQ is an Arrangement 3 design.

EPQN (Arr. 1 and 4)
The model EPQN features the same Better Sound Quality, twelve-bladed aerofoil impeller design as the EPQ, but is available in Arrangement 1 or 4 without inlet obstructions.

Sizes
315 mm to 1850 mm impeller diameters

Performance
Airflow from 0.5 to 80 m³/sec
Static pressure to 3000 Pa

Drive Configurations
Available in both direct and belt drive configurations.

Construction
Class I, II, & III
The EPQ/EPQN plug type plenum fans offer unique performance features that are beneficial for many sound sensitive and higher pressure applications.

The EPQ/EPQN features a twelve-bladed aerofoil impeller versus the nine-bladed impeller of our type EPF/EPFN plug type plenum fans or eight- to ten-bladed impellers with most other competition. The "Q" in the EPQ/EPQN designation stands for Better Noise Quality. Noise quality is a subjective description for noise that is less objectionable.

Looking at the sound comparison, you will notice that the type EPQ/EPQN offers noise (SPL) that is more equally distributed across all frequencies. This can be more pleasant to hear than the sound characteristics of a nine-bladed design. Fans are often dominated in noise by the noise occurring at the blade pass frequency. (Blade pass frequency = RPM x Number of blades/60.) Noise quality is improved by reducing the difference in amplitude between the blade pass amplitudes and the neighbouring frequency amplitudes. The increased higher frequency sound power levels on the twelve-bladed impellers mask the blade pass frequency offering a better sound quality. Although the overall A-weighted sound power levels of the nine-bladed EPF/EPFN fans are slightly lower, the sound "quality" of the twelve-bladed EPQ/EPQN fans may be desirable for the application.

A higher blade pass frequency allows for easier attenuation of the noise, especially when installed inside an air handling unit. In many applications, the use of the EPQ/EPQN design will move the blade pass frequency from the 125 Hz octave to the 250 Hz band. Acoustic silencers will normally perform about 10 dB better in the 250 Hz band.

In addition to sound considerations, there are also additional benefits to using the EPQ/EPQN at higher pressures. Selections over 2000 Pa static pressure are often near the peak pressure of the fan. The additional blades give a higher peak pressure and also add stability to the fan. Twelve smaller passages through the fan impeller are more resistant to flow disturbances on the inlet than nine larger passages. The EPQ/EPQN is thus more resistant to system effects when operating at high pressures and the higher inlet velocities that accompany these selections.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>M³/sec</th>
<th>Pa</th>
<th>RPM</th>
<th>BkW</th>
<th>FREQUENCY, HZ</th>
<th>LwA</th>
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<td></td>
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<td></td>
<td></td>
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<td>EPFN – 9 Blades</td>
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<td>967</td>
<td>9.63</td>
<td>89</td>
<td>94</td>
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</table>

NOTE: Circled figures indicate blade pass frequency.
Impellers
High efficiency, non-overloading aerofoil impellers are provided on all sizes and arrangements.

Arr. 1 and 3 – Aluminium impellers using extruded aluminium blades are standard to size 245 on arrangement 1 and 3 fans, and available as an option on larger sizes. Steel impellers are standard on sizes 270 and larger.

Arr. 4 – Aluminium impellers using extruded aluminium blades are standard to size 600 on direct drive arrangement 4 fans, a popular choice for applications requiring precision balance and improved reliability.

Inlet Cones
Heavy-gauge spun steel inlet cones are closely matched to the impeller intake rim to ensure efficient and quiet operation.

Structural Frame
Frames are constructed of heavy-gauge steel, continuously welded at all connections for maximum strength and rigidity. The “cross frame” bearing support is designed for maximum stability and load distribution.

Shafts
Shafts are AISI Grade 1040 or 1045 hot-rolled steel accurately turned, ground, polished, and ring-gauged for verification. Shafts are generously sized for a first critical speed of at least 1.43 times the maximum speed for the class.

Fan Bearings
Bearings are heavy duty, grease lubricated, spherical roller or adapter mounted anti-friction ball, self-aligning, pillow block type, selected for minimum average bearing life L10 in excess of 40,000 hours at the maximum fan RPM. Considering the long life offered with our standard bearing selections, we do not recommend upgrades to split-roller bearings due to their large size, especially on Arrangement 3 fans.

Inlet Collar
Horizontal configurations are designed to be flex-connected to the perimeter of the square panel without the addition of an inlet collar.
Piezometer Ring
(Airflow Measuring System)

A piezometer ring is available on plug type plenum fans, as well as other Twin City Fan housed fans, as part of an airflow measuring system, based on the principle of a flow nozzle. The inlet cone of the fan is used as the flow nozzle. The flow can be calculated by measuring the pressure drop through the inlet cone. No tubes or sensors are inserted in the high velocity airstream which could obstruct airflow.

The system consists of a piezometer ring mounted at the throat and a static pressure tapping mounted on the face of the inlet cone. A differential pressure transducer and digital display can also be provided.

The pressure drop is measured from the tapping located on the face of the inlet cone to the piezometer ring in the throat. The inlet tapping is connected to the high-pressure side of the transducer and the piezometer ring is connected to the low-pressure side. See diagram on right.

Based on Twin City Fan laboratory tests, the system was determined to be accurate within +/-5%.

Refer to Twin City Fan Engineering Supplement ES-105.

NOTE: Twin City Fan does not recommend placement of flow measuring probes inside the fan inlet cone in the path of airflow. These devices create disturbances and unpredictable performance losses. Twin City Fan will not be responsible for loss of performance due to such devices.
Variable Inlet Vanes
Variable inlet vanes provide economical, stable, and efficient air volume control for manual or motorized operation. Blades are supported with fatigue-resistant steel shafts and two needle roller bearings riding on zone-hardened surfaces to minimize wear. Bearings are lubricated for life with high grade moisture resistant grease and protected with lip seals. The vane bearing housings are welded in position and stiffened with a welded support ring. The welded structure eliminates flutter and vibration while utilizing a cantilevered design to minimize insertion loss.

NOTE: Inlet vanes are not recommended on fans smaller than size 200 due to noise and loss in performance.

Inlet Collar
The standard, square-panel design provides the means for flexible connection on all arrangements without an inlet collar.

Belt Guard
Provides protection to personnel from the moving drive parts. Both standard and OSHA compliant totally enclosed types are available.

Protective Enclosure
Grill style protective enclosure completely encloses all sides and the back of the fan impeller. Side panels are individually removable to provide access to the impeller.

Inlet Screen
Heavy-gauge inlet screen that nests in the inlet funnel for personnel protection on non-ducted inlets.

Arrangement 1 (EPFN and EPQN)
Arrangement 1 features an overhung impeller design suitable for V-belt drive and requires mounting of motor independent of the fan.
- Class I and II available in sizes 122 to 890. See dimensional drawing on page 93.
- Class III available in sizes 182 to 890. Contact factory for dimensional drawing.

Arrangement 3 (Horizontal - EPF and EPQ)
This is the most common plug type plenum fan arrangement for use in OEM and site-built air handling units. Arrangement 3 is suitable for V-belt drive and requires mounting of the motor independently of the fan. Twin City Fan & Blower offers common unitary bases and isolation bases for the fan and motor as accessories.
- Class I and II available in sizes 122 to 890. Class III available in sizes 182 to 890. See dimensional drawing on page 94.
Arrangements 3HA
(Horizontal with Top Mounted Motor)
Arrangement 3HA provides a means for mounting the motor on top of the unit. This design is often desirable when floor space is limited.

Available with a heavy duty Twin City Fan & Blower designed “adjustable motor base” for all fan sizes.

- Models EPF and EPQ.
- Arrangement 3HA with pivot motor base is available in Class I and II for sizes 122 to 542. See dimensional drawing on page 96-97.

Arrangement 3SM
(Horizontal With Side Mounted Motor)
Arrangement 3SM is designed to provide an economical and space-saving means to supply plug type plenum fans with motors mounted to the side of the fan frame. A motor slide base allows for quick and easy belt adjustments.

- Models EPF and EPQ.
- Class I and II available in sizes 165 to 600. Motor limited to maximum frame size shown on drawing. See dimensional drawing on page 95.

Arrangements 3VA
(Vertical with Side Mounted Motor)
Vertical Arrangement 3 is available with a heavy duty Twin City Fan & Blower designed “adjustable motor base” for all fan sizes.

- Models EPF and EPQ.
- Arrangement 3VA with pivot motor base is available in Class I and II for sizes 122 to 542. See dimensional drawing on page 98-99.
- Unless specified otherwise, units will be built for vertical up airflow.
Arrangement 4 (Horizontal)
Direct drive Arrangement 4 mounts the fan impeller directly onto the motor shaft. This arrangement provides a compact fan/motor unit which eliminates belt residue and requires less maintenance than other arrangements. It also negates any drive loss so provides an energy efficient solution.

For these reasons, Arrangement 4 plug type plenum fans are widely used in cleanroom, pharmaceutical, and other critical applications.

Fans can be selected with varying impeller widths to provide desired performance at direct drive motor speeds. Performance changes in the field are usually achieved by means of variable inlet vanes or VFD.

- Models EPFN and EPQN.
- Aluminium impellers using extruded aluminium blades are standard.
- Class I and II available in sizes 122 to 660. See dimensional drawing on pages 100-101.
- Class III available in sizes 182 to 660. See dimensional drawing on pages 102-103.

Arrangement 4 (Vertical)
Vertical Arrangement 4 is available for mounting with either vertical up airflow (inlet under the motor) or vertical down airflow (inlet above the motor).

- Models EPFN and EPQN.
- Aluminium impellers using extruded aluminium blades are standard.
- Class I and II available in sizes 182 to 490.
- Inlet flange available.
- See dimensional drawing on page 104.
Fan Selection Recommendations

1. System effect losses (see AMCA 201) and plenum losses should be estimated and added to the required static pressure, prior to making selections. Refer to AMCA Publication 201 at www.amca.org and Twin City Fan Engineering Data Letter “Fan Performance Troubleshooting Guide” (FE-100) at www.tcf.com.

2. Fans should be selected so that the point of operation is approximately between 55% and 90% of the free delivery point on the fan curve.

3. Avoid selections over 4000 RPM. A narrow width, larger size impeller can be used to avoid this.

4. Arrangements 1 and 4 will offer the best efficiency and lowest noise as there are no inlet obstructions.

5. Where space is available, mount the fan and motor on a sub-base. The motor can be mounted on the fan on Arrangements 3HS, 3HA, 3SM, 3VS, and 3VA.

6. Use inertia-type isolation bases or rigid mounting for lowest fan vibration. Rigid mounting requires dynamic analysis (by others) of the support structure to avoid resonance.

7. Applications exceeding 2500 Pa static pressure are prone to high system effect losses. Use of housed fans (BAE-DWDI) should be considered.

8. Where static pressures over 2000 Pa are required, Model EPQ or EPQN are preferred because of lower operating speeds and improved stability. Select the fan so the design pressure is at least 10% below the peak pressure.

9. Where flow monitoring is required, use a piezometer ring or externally mounted flow measurement station. Fan performance may be substantially affected by flow measurement probes mounted directly in the fan inlet cone. Refer to page 6.

10. For direct drive fans without speed control (or where speed control cannot exceed 50 Hz), select fans at 3 – 5% below the nominal speed of the motor. This will normally cover the uncertainties associated with the system and air balance measurements. Select motors loaded no closer than 90% of the maximum loading of the motor.

11. For multiple fans in a plenum, alternate CW and CCW rotation fans to minimise losses. If fans are not counter-rotating, install walls between each fan to create cells in the outlet plenum.

12. Add losses for duct take-offs per the chart above to pressure requirements of the fan. Bellmouth entries will always reduce losses and are recommended.

13. For highest reliability, specify the required bearing life. For example, the statement “minimum L10 bearing life = 40,000 hours” allows for the best bearing to be put on the fan without creating other problems. Some specifications state “use split roller bearings.” This can cause a number of problems, such as:
   a. On smaller fans, there may not be enough radial load to prevent roller skidding. This is especially a problem for Arrangement 3 fans.
   b. Split roller bearings are not offered in sizes smaller than 36 mm bore. Smaller fans use shafts smaller than this.
   c. The oversized bearing in the inlet will block some air in smaller fans (above the losses that are already included in the EPF/EPQ ratings).

### ADDITIONAL DUCT ENTRANCE LOSS TO BE ADDED TO FAN ESP

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<tr>
<th>DISCHARGE TYPE</th>
<th>CORRECTION FACTOR</th>
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<tbody>
<tr>
<td>Radial and ducted with bellmouth</td>
<td>1.1 x Duct Velocity Pressure</td>
</tr>
<tr>
<td>Radial and ducted without bellmouth</td>
<td>1.4 x Duct Velocity Pressure</td>
</tr>
<tr>
<td>Radial without duct or bellmouth</td>
<td>1.8 x Duct Velocity Pressure</td>
</tr>
<tr>
<td>Flow parallel to shaft and ducted with bellmouth</td>
<td>1.6 x Duct Velocity Pressure</td>
</tr>
<tr>
<td>Flow parallel to shaft and ducted without bellmouth</td>
<td>1.9 x Duct Velocity Pressure</td>
</tr>
<tr>
<td>Flow parallel to shaft without duct or bellmouth</td>
<td>2.4 x Duct Velocity Pressure</td>
</tr>
</tbody>
</table>

*Example: A system requires 14.15 m³/sec at 1250 Pa static pressure at standard air density with one 1250 mm diameter duct with bell-mouth placed in a radial discharge. Determine RPM and absorbed power:*

Duct area = \( \frac{(1.25^2 \times \pi)}{4} = 1.227 \text{ m}^2 \)

Duct velocity = \( \frac{14.15}{1.227} = 11.53 \text{ m/s} \)

Duct velocity pressure = \( 0.5 \times \rho \times v^2 = 0.6 \times 11.53^2 \)

\[= 80 \text{ Pa @ std. cond.} \]

Entrance loss correction factor = \( 1.1 \times \text{duct velocity pressure} = 1.1 \times 80 = 88 \text{ Pa} \)

Thus, select the fan for = \( 1250 + 88 = 1338 \text{ Pa static pressure} \)
Location and Placement of Fans in Air Handlers
1. Centre the fan inlets in both the horizontal and vertical planes.
2. For inlet clearance, see Figure 1. The flow should converge at an angle not greater than 45° when approaching the opening for the fan inlet. A minimum of one fan impeller diameter clearance is recommended.
3. In the fan outlet plenum, a minimum wall clearance of one-half fan impeller diameter to the periphery of the fan impeller is recommended.
4. Figure 1 shows that the minimum clearance between the back of the fan impeller and the nearest component downstream (Dim. E) should be one impeller diameter. Small clearances do not allow the flow to equalize behind the fan impeller and the pressure drop of the downstream component is increased.
5. When the flow enters the inlet plenum perpendicular to the fan shaft, large system effect losses can occur. See Figure 2 for a recommended flow baffle or a vortex breaker that may help preserve rated fan performance.
6. When two or more fans are installed in a plenum, divide the plenum into imaginary cells of equal area. Centre the fan inlets on each cell. See Figure 3.

Installation Recommendations
1. Install the fan so the flexible connector on the inlet remains uncollapsed during operation.
2. Install thrust restraints (snubbers) to maintain the axial position of the fan when it is generating pressure.
3. Peripheral equipment, such as electrical components, inverters, control panels, etc., should be positioned away from the high velocity air entering or leaving the fan.
4. Adjust springs on the isolation base so that spring deflection is approximately equal for all isolators.
5. Follow safety, installation, start-up, and maintenance instructions supplied with each fan.

Figure 1. Recommended Location of Fan in Plenum

Figure 2. Flow Baffle and Vortex Spin Breaker Location

Figure 3. Location of Counter-Rotating Fans
### Maximum RPM, Impeller Weights, & WR2 – EPF and EPFN

<table>
<thead>
<tr>
<th>EPF EPFN</th>
<th>IMPPELLER DIA (mm)</th>
<th>MAX WT. (kg)</th>
<th>DIA (20°C) (mm)</th>
<th>STEEL</th>
<th>MAX WT. (kg)</th>
<th>DIA (20°C) (mm)</th>
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<th>MAX WT. (kg)</th>
<th>DIA (20°C) (mm)</th>
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<th>WR2 – EPFN</th>
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<td>122</td>
<td>238 200</td>
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### Maximum RPM, Impeller Weights, & WR2 – EPQ and EPQN

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<tr>
<th>EPQ EPQN</th>
<th>IMPPELLER DIA (mm)</th>
<th>MAX WT. (kg)</th>
<th>DIA (20°C) (mm)</th>
<th>STEEL</th>
<th>MAX WT. (kg)</th>
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<th>MAX WT. (kg)</th>
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### Bare Fan Weights

<table>
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<th>ARR. 2 (EPQ)</th>
<th>ARR. 3 (EPQ)</th>
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<td>400</td>
<td>6.8 0.12</td>
<td>3468</td>
<td>6.8 0.12</td>
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</tbody>
</table>

**NOTES:**
1. Arrangement 1 and 3 weights include an aluminium impeller on size 122 through 245, and a steel impeller on size 270 through 730.
2. Arrangement 4 weights include an aluminium impeller on all sizes.
3. Weights are for the 12-blade impeller design (EPQ and EPQN), 9-bladed designs (EPF and EPFN) are slightly less and can be reduced by the difference between the impeller weights tabulated above.
4. Weights do not include motor, drive, motor base, or slide base.
Notes:

1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet Lwa sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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**PERFORMANCE CURVES**

**EPF 150**

- **Fan Efficiency Grade = FEG 67**
- **q\_v - Flow (m\(^3\)/sec)**
- **P\_d - Fan Velocity Pressure (Pa)**
- **F - Fan Total Pressure (in W.G.)**
- **P\_F - Fan Total Pressure (Pa)**

- **Notes:**
  1. Performance certified is for Installation Type A: Free inlet, Free outlet.
  2. Power rating (kW) does not include transmission losses.
  3. Performance ratings do not include the effects of appurtenances (accessories).
  4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
  5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
  6. Ratings do not include the effects of duct end correction.
  7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
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5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
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6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.

Fan Efficiency Grade = FEG 75

PERFORMANCE CURVES
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet Lwa sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwiA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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1. Performance certified is for Installation Type A: Free inlet, Free outlet.
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4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
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3. Performance ratings do not include the effects of appurtenances (accessories).
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7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
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7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
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 sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.

Values shown are for inlet LwA sound power levels for Installation Type A: Free inlet, Free outlet.

Ratings do not include the effects of duct end correction.

The A-weighted sound ratings shown have been calculated per AMCA Standard 301.

Notes:
1. Performance certified is for Installation Type A: Free inlet, Free outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
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7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
# Horizontal, Arr. 1 - Class I and II

## Dimensions

### Table: Dimensional Data

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**NOTES:**
1. Horizontal applications only.
2. ‘CW’ rotation is standard, ‘CCW’ rotation is optional. Rotation is determined by viewing the drive end.
3. Split roller bearing upgrades are not available on fans with ‘SD’ dimensions less than 36 mm.
4. Arrangement 1 is available on models EPFN and EPQN.

**Dimensions are in (mm) unless otherwise stated and are subject to change.**

Certified Drawings available upon request.
### Class III

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**Notes:**
1. Horizontal applications only.
2. ‘CW’ rotation is standard, ‘CCW’ rotation is optional. Rotation is determined by viewing the drive end.
3. Split roller bearing upgrades are not available on fans with ‘SD’ dimensions less than 36 mm.
4. Arrangement 3 is available on models EPF and EPQ.
5. Shaft diameter (‘SD’) on Size 730, Class III is turned down from 112 mm.
6. Shaft diameter (‘SD’) on Size 807, Class III is turned down from 125 mm.
Horizontal, Arr. 3SM - Class I and II

NOTES:
1. Horizontal applications only.
2. ‘CW’ rotation is standard, ‘CCW’ rotation is optional. Rotation is determined by viewing the drive end.
3. Motor mount is symmetrical for left or right application.
4. Optional bolt-on protective enclosure.
5. Split roller bearing upgrade is not available when ‘SD’ dimension is less than 36 mm.
6. Arrangement 3SM is available on models EPF and EPQ.

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DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE.
CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.
Horizontal, Arr. 3HS/3HA - Class I and II

### Arr. 3HS

- **Motor Position:** L (optional)
- **Motor Position:** Ri (standard)
- **Drive End View**
- **Section A-A**

### Arr. 3HA

- **Pivot-Style Motor Mount (Motor Size 254T & Larger)**
- **Drive End View**
- **Section A-A**

**NOTES:**
1. Horizontal applications only.
2. ‘CW’ rotation is standard, ‘CCW’ rotation is optional. Rotation is determined by viewing the drive end.
3. Fan equipped with standard NEMA slide base.
4. Split roller bearing upgrades are not available on fans with “SD” dimensions less than 36mm.
5. Arrangement 3HS is available on models EPF and EPQ.

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**DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.**
## Horizontal, Arr. 3HS/3HA - Class I and II (cont.)

### Arr. 3HS

**Drive End View**

**Inlet End View**

**Notes:**
1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Fan equipped with standard NEMA slide base.
4. Split roller bearing upgrades are not available on fans with "SD" dimensions less than 36 mm.
5. Arrangement 3HS is available on models EPF and EPQ.

### Arr. 3HA

**Drive End View**

**Inlet End View**

**Notes:**
1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Split roller bearing upgrades are not available on fans with "SD" dimensions less than 36 mm.
4. Arrangement 3HA is available on models EPF and EPQ.

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**Notes:**
- Dimensions are in (mm) unless otherwise stated and are subject to change. Certified drawings available upon request.
**Vertical, Arr. 3VS/3VA - Class I and II**

**Arr. 3VS**

- **Motor Position 'L' (Optional)**
- **Motor Position 'R' (Standard)**

**Arr. 3VA**

- **'FR' Max. Motor**
- **Pivot-Style Motor Mount (Motor Size 254T & Larger)**

**Notes:**
1. Vertical applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Vertical up (VU) airflow is standard. Vertical down (VD) airflow requires brackets mounted on drive end.
4. Split roller bearing upgrades are not available on vertical fans.
5. Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
   - Size 122–365: 0.56
   - Size 402–542: 0.81
6. Arrangement 3VS is available on models EPF and EPQ.
7. Arrangement 3VA is available on models EPF and EPQ.

**Dimensions are in (mm) unless otherwise stated and are subject to change. Certified drawings available upon request.**
Arr. 3VS

1. Vertical applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Vertical up (VU) airflow is standard. Vertical down (VD) airflow requires brackets mounted on drive end.
4. Split roller bearing upgrades are not available on vertical fans.
5. Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
   - Size 122–365: 0.56
   - Size 402–542: 0.81
7. Arrangement 3VS is available on models EPF and EPQ.

Arr. 3VA

1. Vertical applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Vertical up (VU) airflow is standard. Vertical down (VD) airflow requires brackets mounted on drive end.
4. Split roller bearing upgrades are not available on vertical fans.
5. Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
   - Size 122–365: 0.56
   - Size 402–542: 0.81
6. Arrangement 3VA is available on models EPF and EPQ.

DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.
# Horizontal, Arr. 4 - Class I and II

![Diagram of horizontal fan arrangement]

## Class I and II, Size 122 - 270

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**NOTES:**
1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.

**DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.**
### Horizontal, Arr. 4 - Class I and II

**NOTES:**
1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Spring mounting points S5 & S6 are for sizes 542 and larger.

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**DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.**
Horizontal, Arr. 4 - Class III

**NOTES:**
1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.

**Class III, Size 182 - 330**

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**DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE.**

CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.
Horizontal, Arr. 4 - Class III

NOTES:
1. Horizontal applications only.
2. 'CW' rotation is standard, 'CCW' rotation is optional. Rotation is determined by viewing the drive end.
3. Spring mounting points S5 & S6 are for sizes 445 and larger.

Class III, Size 365 - 660

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DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.
Vertical, Arr. 4V - Class I and II

NOTES:
1. Vertical applications only.
2. ‘CW’ rotation is standard, ‘CCW’ rotation is optional. Rotation is determined by viewing the drive end.
3. Spring bracket holes are sized per spring type. Hole diameters when bracket is used as a mounting foot are as follows:
   - Size 182–365: 0.56
   - Size 402–490: 0.81

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DIMENSIONS ARE IN (mm) UNLESS OTHERWISE STATED AND ARE SUBJECT TO CHANGE.
CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.
Fans shall be Model EPF, EPFN, EPQ or EPQN centrifugal plenum (plug) type, as manufactured by Twin City Fan & Blower, Minneapolis, Minnesota.

Fans shall have a sharply rising pressure characteristic extending through the operating range and continuing to rise beyond the peak efficiency to ensure quiet and stable operation. Fans shall have a non-overloading design with self-limiting horsepower characteristics and shall reach a peak in the normal selection area. All fans shall be capable of operating over the minimum pressure class limits as specified in AMCA’s Standard 2408-69.

**PERFORMANCE** — Performance ratings shall conform to AMCA Standard 205 (fan efficiency grade), 211 (air performance) and 311 (sound performance). Fans shall be tested in accordance with ANSI/AMCA Standard 210 (air performance) and 300 (sound performance) in an AMCA accredited laboratory. Fans shall be licensed to bear the AMCA certified ratings seal for both sound and air, and fan efficiency grade (FEG). Arrangement 3 fans shall be tested and rated with shaft, bearings, and bearing bar in the inlet Sound certification shall apply to both inlet and outlet sound power levels.

Fans shall have a sharply rising pressure characteristic extending through the operating range and continuing to rise beyond the peak efficiency to ensure quiet and stable operation. Fans shall have a non-overloading design with self-limiting horsepower characteristics and shall reach a peak in the normal selection area. All fans shall be capable of operating over the minimum pressure class limits as specified in AMCA Standard 99.

**CONSTRUCTION** — Fans shall be designed without a scroll type housing and shall incorporate a non-overloading type backward inclined aerofoil blade impeller, heavy-gauge reinforced steel inlet plate, structural steel frame, and shaft and bearings.

**FRAME AND INLET PANEL** — Inlet panels shall be of heavy-gauge reinforced steel construction. The inlet panel incorporates a removable spun inlet cone designed for smooth airflow into the accompanying inlet retaining ring of the fan impeller. A square, formed lip suitable for attachment of a boot connector shall surround the unit.

**IMPELLER** — Impellers shall have a spun non-tapered style blade retaining ring on the inlet side to allow higher efficiencies over the performance range of the fan. Sizes 245 and smaller shall have aerofoil-shaped extruded aluminum blades. Sizes 270 and larger shall have die-formed aerofoil steel blades with the option of extruded aluminum blades. All impellers on direct drive arrangement 4 fans shall have aerofoil-shaped extruded aluminum blades. All hollow blade impellers shall be continuously welded around all edges. EPF and EPFN impellers shall have nine blades for high efficiencies. EPQ and EPQN impellers shall have twelve blades for better sound quality. All impellers shall be statically and dynamically balanced on precision electronic balancers to a Balance Quality Grade G6.3 (3.8 mm/s rms) per ANSI/AMCA 204 or better.

**SHAFT** — Shafts shall be AISI 1040 or 1045 hot rolled steel, accurately turned, ground, polished, and ring gauged for verification. Shafts shall be sized for the first critical speed of at least 1.43 times the maximum speed. All shafts must be dial indicated for straightness after the keyways are cut and straightened as required.

**FAN BEARINGS** — Bearings shall be heavy duty, grease lubricated, spherical roller or adapter mounted anti-friction ball, self-aligning, pillow block type and selected for a minimum bearing life L10 in excess of 40,000 hours at the maximum fan RPM. All bearings shall be equipped with greasable zerk fittings and, where necessary, extended lube lines for easy access for lubrication.

**DRIVE** — Motor sheaves shall be cast iron, variable pitch on applications 7.5 kW and smaller, and fixed pitch on 11 kW and larger. Drives and belts shall be rated for 150% of the required motor rating.

**FINISH AND COATING** — The entire fan assembly, excluding the shaft, shall be thoroughly degreased and deburred before application of a rust-preventative primer. After the fan is completely assembled, a finish coat of paint shall be applied to the entire assembly. The fan shaft shall be coated with a petroleum-based rust protectant. Aluminum components shall be unpainted.

**ACCESSORIES** — When specified, accessories shall be provided by Twin City Fan & Blower to maintain one source responsibility.

**VARIABLE INLET VANES** — When specified, the variable inlet vanes shall be internal “nested” type. Each assembly is to have eleven vanes on sizes 245 and larger, and eight vanes on sizes 182 through 222. Each vane assembly shall be complete with quadrant and handle, suitable for manual or automatic operation. Construction shall be heavy-gauge and shall be of the cantilever design. Vanes are lubricated for life with a high quality moisture-resistant lubricant.

**FACTORY RUN TEST** — All fans prior to shipment shall be completely assembled and test run as a unit at the specified operating speed or maximum RPM allowed for the particular construction type. Maximum vibration shall be within the limits of ANSI/AMCA 204 Balance Quality Grade G6.3 (3.8 mm/s rms). Balance readings shall be taken by electronic type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.

**GUARANTEE** — The manufacturer shall guarantee the workmanship and materials for its EPF, EPFN, EPQ and EPQN fans for at least twelve (12) months from start-up or eighteen (18) months from shipment, whichever occurs first.
INDUSTRIAL PROCESS AND COMMERCIAL VENTILATION SYSTEMS

CENTRIFUGAL FANS | UTILITY SETS | PLENUM & PLUG FANS | INLINE CENTRIFUGAL FANS
MIXED FLOW FANS | TUBEAXIAL & VANEAXIAL FANS | PROPELLER WALL FANS | PROPELLER ROOF VENTILATORS
CENTRIFUGAL ROOF & WALL EXHAUSTERS | CEILING VENTILATORS | GRAVITY VENTILATORS | DUCT BLOWERS
RADIAL BLADED FANS | RADIAL TIP FANS | HIGH EFFICIENCY INDUSTRIAL FANS | PRESSURE BLOWERS
LABORATORY EXHAUST FANS | FILTERED SUPPLY FANS | MANCOOLERS | FIBERGLASS FANS | CUSTOM FANS