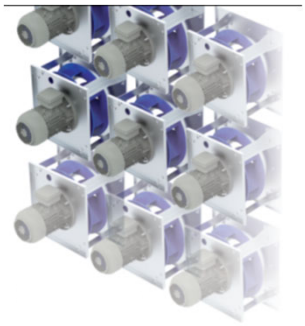


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AGENDA

- Introduction to Fan Array Systems
- Why Use Fan Arrays?– Benefits
- Mounting Instructions and Recommendations
- Fan Energy Index (FEI) vs. Fan Efficiency Grade (FEG)
- Q&A

2



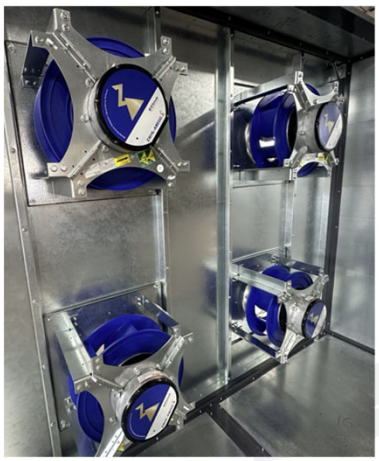
INTRODUCTION TO FAN ARRAY SYSTEMS

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What is a fan array?

- Multiple smaller fans working together instead of a single large fan.
- Variety of configurations possible with both AC and EC fans.





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Fan Array





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Advantages with Fan Arrays

- Provides **Redundancy**
- **Saves** Energy
- Overall Lower **noise**
- **Lower** AHU length
- More **Homogenous** flow pattern through the coils
- **Better** Air flow distribution











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Video: Homogenous Flow

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Important Guidelines for Fan Array Systems

- All fans should be of the same size and type
- All fans should work at the same duty point
- Arrangement of fans symmetrical over cross section
- All fans should be controlled by one control signal



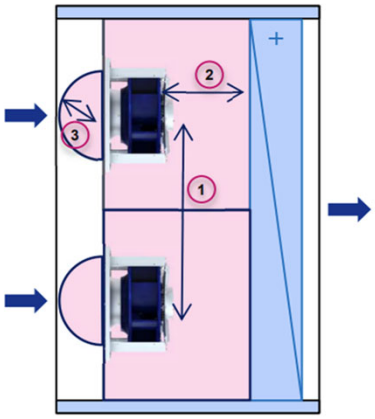


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Mounting Instructions

Distances to other components

- Fan Installation inside Units

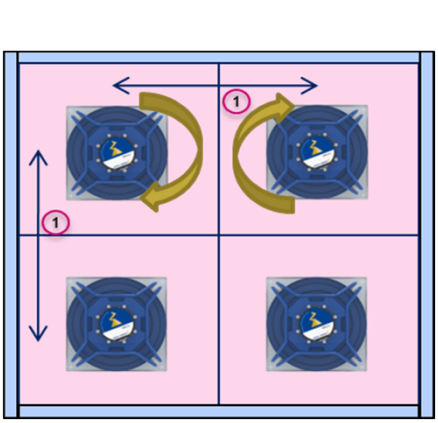


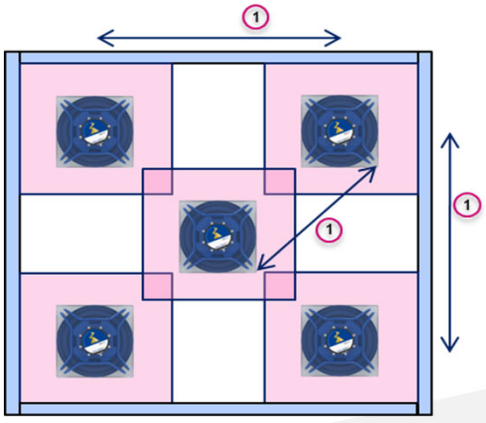
- 1 ≥ 1.8 x DSA
- 2 ≥ 1.0 x DSA
- 3 ≥ 0.5 x DSA

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Mounting Instructions

- Distance between fan axis / Diagonal distance ≥ 1,8 x DSA without separation plate

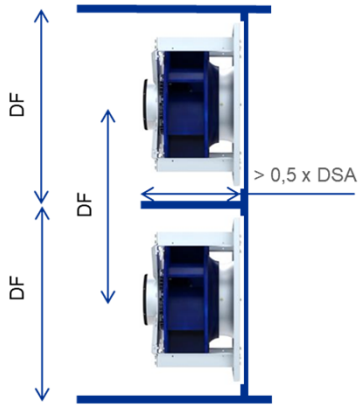




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Mounting Instructions

Arrangement / Spacing of Array varies according to manufacturers; usually function of fan diameter



DF > 1.8 x DSA

- No sensible influence on suction and pressure side

DF = 1.8 – 1.6 x DSA

- No influence on suction side, a separation wall reduces the acoustics on pressure side (compared without separation wall)

DF = 1.6 – 1.4 x DSA

- Little influence on suction side, on pressure side a separation wall is necessary to optimize the air flow and acoustics

DF < 1.4 x DSA

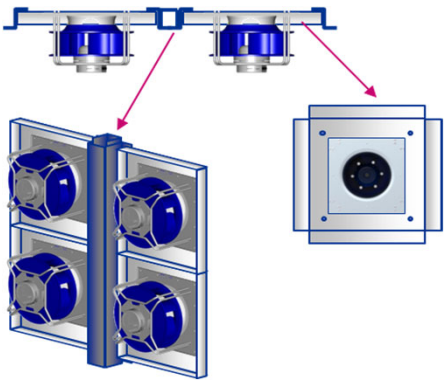
Significant influence, no practical design

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Mounting Instructions

Example of a fan assembling

- For optimal performance, one or more components are positioned between the fans



- Strong vertical profiles
  to hold and fix the metal sheet sections, depending on the number of fans 4-6 mm thickness

- GR modules mounted on metal sheet sections
  shaped like box type
  thickness 2mm for fan sizes > 450, larger sizes 3 mm

NOTE: Sketch represents an idea only and needs to be verified and approved by the AHU manufacturer.

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Fan Array Construction



- Rigid substructure (e.g. reinforced panels, Unistrut profiles) to reinforce fan wall
- Fan Wall rigid substructure should be fastened to system wall / roof / floor panels
- Non-rigid fan walls increase vibration; damage fans, housing, etc; leading to system failure
- Relevant standards on vibration: AMCA 204-20; ISO 14694

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FEG and FEI

- FEG = Fan Efficiency Grade
- FEI = Fan Energy Index





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Fan Efficiency Grade (FEG)

Traditional Fan Efficiency Rating

- FEG applies to the efficiency of the fan only and does not take into account the efficiency/ inefficiency of **the motor, belt, pulley and controller**.

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Fan Efficiency Grade (FEG)

Traditional Fan Efficiency Rating

- FEG is based on peak total efficiency for a given fan size.
- FEG is established by plotting the peak total efficiency of the impeller diameter, then reading the associated FEG band in which this point falls.
- **For example**, a fan with an impeller diameter of 355 mm and a peak total efficiency of 71% would have an FEG of 80.

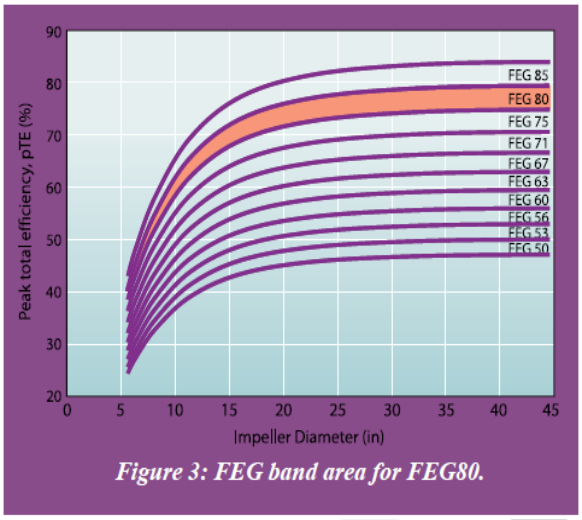


Figure 3: FEG band area for FEG80.

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Fan Energy Index (FEI)

Latest Efficiency Standard

FEI applies to the **Total** efficiency of the Complete system = fan, motor, belt, pulley and controller

Overall Efficiency =

Fan Efficiency x

Transmission Efficiency (Belt, Pulley, etc.) x

Motor Efficiency x

Controller Efficiency



How do you read FEI rating?

Latest Efficiency Standard

- FEI = 1.00 means the actual fan efficiency meets the baseline efficiency.
- FEI > 1.00 means the fan efficiency exceeds the baseline.
- FEI > 1.00 implies lower power consumption for that fan.



Understanding FEG and FEI- Constant Flow

- Selected fan : AMCA Certified Ziehl-Abegg ECblue Fan
- **Case I :- Constant CFM ,variable pressure**

S. No.	CFM	Pressure (mm)	FEG	FEI	Power (Watts)
1	5000	60	85	1.60	2130
2	5000	65	85	1.58	2309
3	5000	70	85	1.56	2489

FEG is constant and not changing with duty point as it depends on peak total eff.

FEI Changes with duty point as it depends on duty point

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Understanding FEG and FEI- Constant Flow

- Selected fan : AMCA Certified Ziehl-Abegg ECblue Fan
- **Case II:- Constant CFM ,variable pressure**

Sl. No.	CFM	Pressure (mm)	FEG	FEI	Power (Watts)
1	5000	60	85	1.60	2130
2	5500	60	85	1.59	2338
3	6000	60	85	1.58	2558

FEG is constant and not changing with duty point as it depends on peak total eff.

FEI Changes with duty point as it depends on duty point

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How does FEI help a customer?

Latest Efficiency Standard

- For a given application (airflow and pressure), different fan types and sizes can all be compared using the same baseline.
- FEI is superior to other fan efficiency metrics that are based on peak fan efficiency of the Impeller only.
- Customer can select a fan based on Real Power Consumption at the duty point



FEI vs. FEG: Key Differences

Feature	FEI (Fan Energy Index)	FEG (Fan Efficiency Grade)
Measures	Total system efficiency	Peak fan efficiency only
Includes	Motor, drive, fan performance	Fan-only performance
Regulatory Preference	Preferred in modern standards	Being phased out
Real-World Relevance	Aligns with actual energy use	Doesn't reflect full system efficiency



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