



axial fans int srl

OFFER N. - 7.7.2021 - REV 1

MODEL 4.3A-4877-05-STD-TS

Client Name: ZANJAN PETROCHEMICAL  
Project Name: ZANJAN PETROCHEMICAL  
Project Reference: 1055  
Item: AE-2001

## INPUT

### Duty Point

Fan Quantity	<b>8 (4 AP+4 AV)</b>
Air Flow	<b>170.1 m<sup>3</sup>/s</b>
Static Pressure	<b>155 Pa</b>
Air Density	<b>0.827 kg/m<sup>3</sup></b>
Air Temperature	<b>65.6 °C</b>
Altitude	<b>1846 m</b>
Air Humidity	<b>43 %</b>

### Installation

Application	<b>Process Air Cooler</b>
Type	<b>Induced</b>
Inlet Shape	<b>Flanged</b>
Tip Clearance	<b>0.003 S/Diam.</b>
Diffuser	<b>Not present</b>
Inlet Obstacles	<b>Not present</b>
Outlet Obstacles	<b>Not present</b>

### Fan specification

Diameter	<b>16 ft</b>
Airfoil	<b>Aluminum</b>
Blade Pitch Adjustment	<b>Manual + Auto</b>
Rotational Speed	<b>222 rpm</b>
Tip Speed	<b>56.7 m/s</b>

### Restrictions

Min Pressure Margin	<b>21 %</b>
Min Air Flow Margin	<b>10 %</b>
Min Static Efficiency	<b>20 %</b>
Min Blade Number	<b>3</b>
Min Temperature	<b>- 50°C</b>
Max Power	<b>45 kW</b>
Max Noise	<b>85 SPL</b>
Distance	<b>1 m</b>
Position	<b>Above</b>

## OUTPUT

### Details

Fan Static Pressure	<b>155.0 Pa</b>	Static Efficiency	<b>69.60 %</b>
Pressure Recovery	<b>0.0 Pa</b>	Total Efficiency	<b>84.62 %</b>
Dynamic Pressure	<b>33.47 Pa</b>	Rotor Shaft Power	<b>37.91 kW</b>
Total Pressure	<b>188.47 Pa</b>	Rotor Shaft Power at Min Temp.	- kW
Fan Diameter	<b>4877 mm</b>	Pressure Margin (API / Pitch)	<b>21.0 / 36.0 %</b>
Fan Ring Diameter	<b>4908 mm</b>	Volume Margin	<b>10.0 %</b>
Blade Airfoil	<b>4.3A</b>	Aerodynamic Axial Force	<b>3520.4 N</b>
Blade Material	<b>Aluminum</b>	Blade Failure Load	<b>11685.0 N</b>
Rpm	<b>222.0 rpm</b>	Max Residual Unbalance	<b>15.4 N</b>
Blade Frequency	<b>282.1 cpm</b>	Rotor Weight	<b>105.1 kg</b>
Blade Tip Speed	<b>56.7 m/s</b>	Rotor Inertia (PD <sup>2</sup> )	<b>685.1 kg m<sup>2</sup></b>
Number of Blades	<b>5</b>	Torque at design speed	<b>1630.7 N m</b>
Blade Pitch Adjustment	<b>Manual</b>	PWL	<b>93.7 dB(A)</b>
Blade Tip Pitch Angle	<b>16.23 deg</b>	SPL inlet/outlet	<b>78.0 dB(A)</b>
Blade Shaft Pitch Angle	<b>12.2 deg</b>	SPL side	<b>69.0 dB(A)</b>




### Sound spectrum

Octave [Hz]	31.5	63.0	125.0	250.0	500.0	1000.0	2000.0	4000.0	8000.0
PWL [dB]	96.7	98.7	98.7	94.7	91.7	88.7	80.7	76.7	72.7
Inlet/Outlet SPL [dB]	81.0	83.0	83.0	79.0	76.0	73.0	65.0	61.0	57.0
Side SPL [dB]	72.0	74.0	74.0	70.0	67.0	64.0	56.0	52.0	48.0
Tolerance +/-	5.0	5.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0


tolerance on overall sound values +/- 2 dB(A)

IMPORTANT NOTE: The selected fan has to be checked and approved by AFI in order to operate at specified rotation speed and blade pitch angle  
You are requested to contact AFI in case any of these values or other boundary conditions would change after installation  
NOTE: AFI must be informed in case of fan operation under frequency variator (inverter) to allow AFI to check for any possible critical speed

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<b>Vendor:</b>  Petro Kimia Arvin Co. <b>PETRO KIMIA ARVIN CO.</b>  Project No. 318	<b>EPs Contractor:</b>  Petrochemical Industries Design & Eng. Company (PIDEC)  Project No. 1231	<b>Zanjan Urea Fertilizer Project</b>		<b>Owner:</b>  ZANJAN Agricultural & Fertilizer Industries Co.  Project No.: 214	
		<b>AXIAL FAN SPECIFICATION FOR ALL ITEMS</b>			
		<b>Vendor's Doc. No.: PKA-TH98-HM-318-SPE-103</b>	<b>Rev.: 01</b>		
		<b>PIDEC Doc. No.: VD-1231-01-253-SPE-103</b>			

<b>AXIAL FAN DATA SHEET</b>		
<b>BASIC DATA</b>		
<b>Item No.</b>	AE-2001	
<b>Quantity:</b>	8	
<b>Quantity</b>	<b>Manual Adjustable Pitch</b>	4
	<b>Automatic Adjustable Pitch</b>	4
<b>Positioner</b>	for AV fans	
<b>Lock up</b>	-	
<b>Blade Material</b>	<b>Aluminum</b>	Yes
	<b>Fiber glass</b>	No
<b>Type of Air cooler</b>	Induced	
<b>Fan Ring Type.</b>	Flanged	
<b>Fan Diameter</b>	16	(ft)
<b>Fan Ring Diameter</b>	4908	(mm)
<b>Fan Ring Height</b>	600	(mm)
<b>Fan -Shaft Outside Diameter</b>	70	(mm)
<b>Altitude</b>	1846	(m)
<b>Relative Humidity (Min. / Max.)</b>	43%	(%)
<b>Temperature inlet (Min. / Max.)</b>	65.6	° C
<b>Actual flow</b>	170.10	(m <sup>3</sup> /s)
<b>Actual static pressure</b>	155	(Pa)
<b>Fan RPM</b>	222	(rpm)
<b>Tip speed</b>	56.7	(m/s)
<b>Motor power rating</b>	45	(KW)
<b>Noise Level (1m under fan)</b>	<85	(db)

	<b>SOCIETA' / COMPANY</b> AXIAL FANS INT	<b>CODICE / CODE</b> IM 06
	<b>TIPO DOCUMENTO / TYPE OF DOCUMENT</b> MANUALE / MANUAL	<b>DATA / DATE</b> 2020-10-13
	<b>TITOLO / TITLE</b> INSTALLATION AND MAINTENANCE MANUAL FOR FANS SERIES AV	<b>REV. / REV.</b> 2

## 2.8 Exploded view and part list

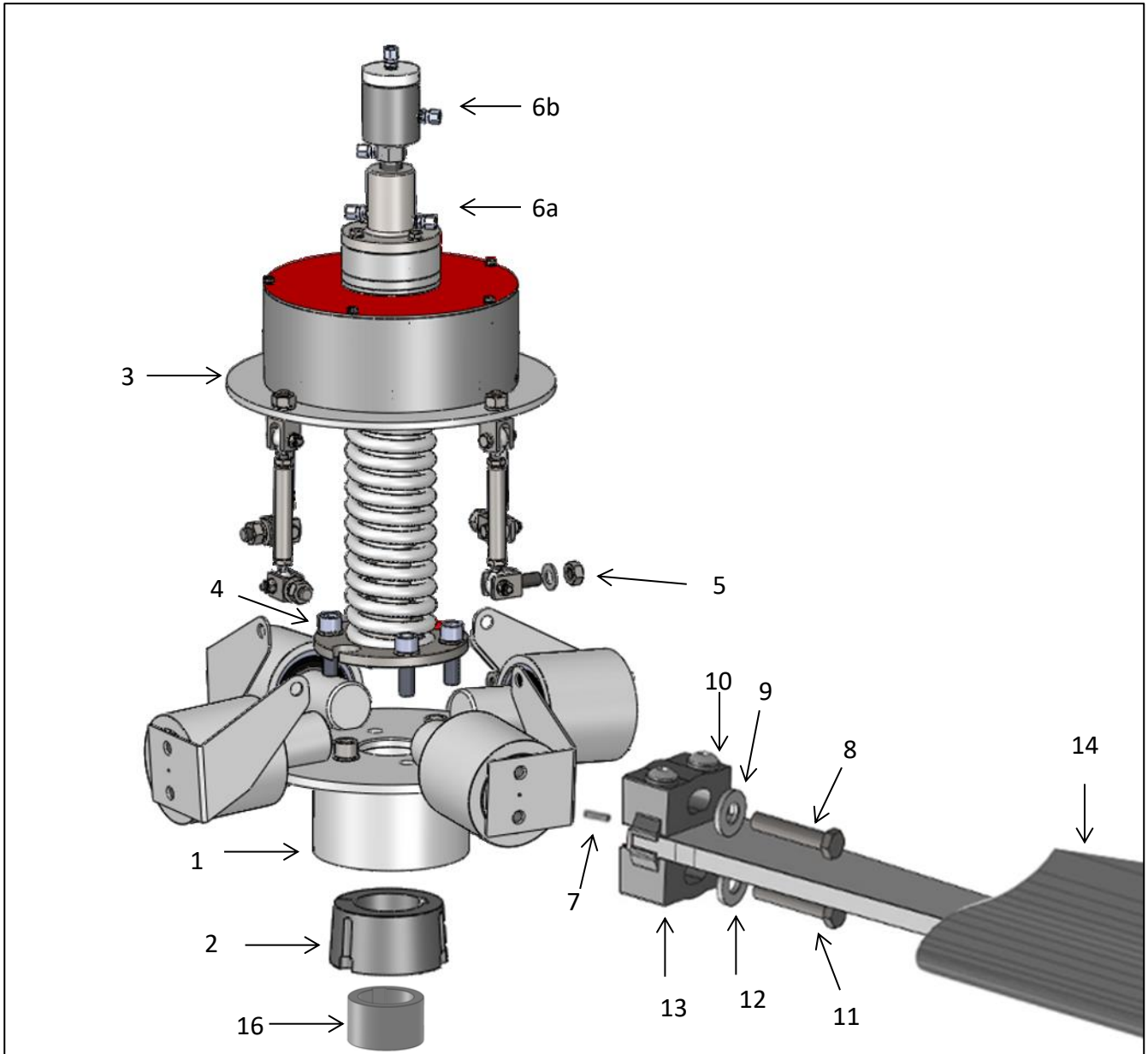



Figure 4 – Hub with taper bushing, exploded view

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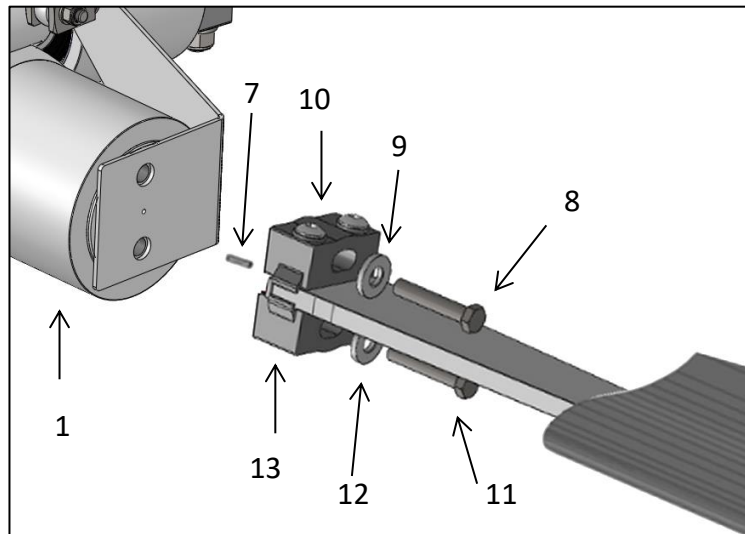


Figure 10 – Blade installation

### 3.6 Blade angle adjustment

- 1 For secondary adjustment only: loosen the two bolts connecting blade to hub (8 and 11) (figure 10).
- 2 Place an inclinometer on the steel shaft or on the top of the blades (upper side) at about 50 mm (2 inches) from the blade tip. If the inclinometer is placed at blade tip, it must be long at least as much as the profile width. Refer to the fan datasheet for the design pitch angle at shaft or at tip of the blade.
- 3 Rotate the blade around the elastic pin axis until the desired angle is set.

NOTE: If the rod is placed on the right, pitch angle corresponding to the maximum pressure instrument (minimum angle) has a tolerance of  $\pm 2-3$  degrees, due to settling and backlashes that are absolutely normal and do not affect the performance of the fan upon the regulation of the pitch angle.

**ATTENTION:** If rods are positioned on the right side (see figure 2), the pitch angle set upon actuator mounting (without power air) is the maximum angle of incidence that can be reached by the fan; if enabled, the actuator can only decrease blade pitch angle. When the rods are on the left side (see figure 2), the pitch angle set upon actuator mounting (without power air) is the minimum angle of incidence that can be reached by the fan; if enabled, the actuator can only increase blade pitch angle.

In case of rods on the right side, pitch angle shall be adjusted without enabling the power air line. In case of rods on the left side, pitch angle shall be adjusted setting the maximum value of the power air line.

**ATTENTION:** For safety reasons, blade pitch adjustment should be carried out without inserting power air. If the rods are placed on the left side (see figure 2) the angle must be measured by setting the maximum power air and the regulation must be carried out removing power air.

NOTE: The relationship between instrument pressure and pitch angle from maximum to minimum value is not linear; moreover, when the fan is still, at each instrument pressure up to the maximum pressure range, corresponds an angle which is not always stable, but may vary of  $\pm 2-3$  degrees: this is considered normal as there are no loads and aerodynamic forces during operation.

- 4 Tighten the two bolts (8 and 11), not yet to the full torque (see chapter 8).
- 5 Re-check the angle.