



# LF系列轴流大叶轮

LF series axial flow big impeller

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LF系列轴流大叶轮是应用航空技术研制而成的新产品，采用机翼型中空叶片，具有高效率、低噪声、耗电省、运行可靠、平衡精度优良、精致美观、安装方便、角度可调等特点。该产品是我公司多年来研制、开发并大批量投产的产品，产品进行了多次更新换代，标准化程度高，已趋于完善。该产品广泛用于各种冷却塔、蒸发式冷凝器、空气冷却器（如石油、石化、天然气和冶金工业空冷器）等装置。

LF series axial big impeller is a kind of the new product designed using aeronautics. The impeller is made of aerofoil with empty in the middle of blades. It has such features as high efficiency, low noise, low consumption, reliable operation, precise balance, exquisite and beautiful, installation convenience, adjustable angle etc. It was manufactured by our company, and updated many times. Thus it has mostly been standardized, and had better process. And it is widely used for cooling towers, evaporation condensers, air cooled heat exchangers used for petroleum, petrochemical, natural gas, metallurgy and heat and power plant industries.

## 概述

## Abstract

我公司LF系列轴流大叶轮产品的设计制造符合下述标准：

JB/T10562-2006 《一般用途轴流风机技术条件》。

JB/T 9099-2002 《冷却塔轴流通风机》。

HG/T3132-2007 《L型冷却塔风机》。

NB/T47007-2010(JBT 4758) 《空冷式热交换器》。

ISO 13706-2006 《石油、石化和天然气工业. 风冷热交换器》



本手册用于介绍我公司LF系列标准化大叶轮的结构配置，所涉及到的叶轮性能、噪音及外形尺寸可直接使用我公司的选型软件获取。选型软件的输出表单参见附录A.

LF series impellers are designed and produced according with following standards

JB/T10562-2006 Technical specification for general purpose axial fans

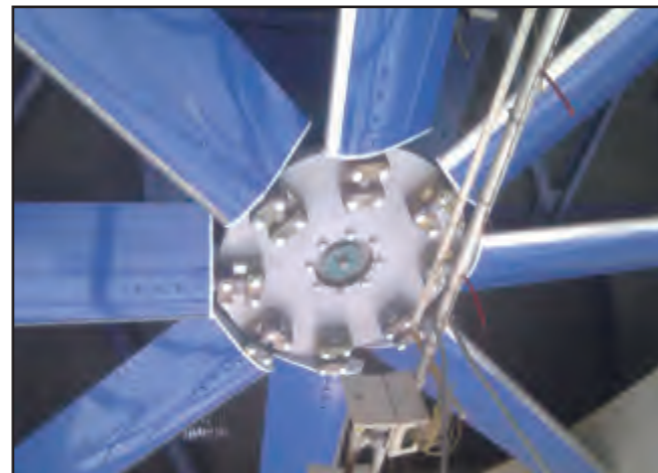
JB/T 9099-2002 Axial flow fans for cooling tower

HG/T 3132-2007 L type cooling tower fan

NB/T 47007-2010(JBT 4758) Air-cooled heat exchanger

ISO 13706-2006 Petroleum, petrochemical and natural gas industries-Air-cooled heat exchangers

This manual introduces the configuration of the LF series standardized big impeller in our company. The performance, noise and outline dimensions can be got from selection soft as in the appendix A.





## 大叶轮结构优势 Big impeller advantages

### 1. 零弯矩专利 Zero-moment patent

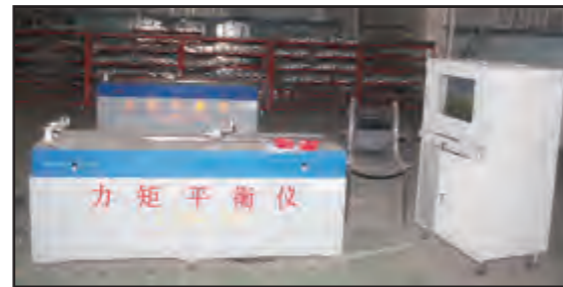
我公司LF系列大叶轮设计采用零弯矩设计专利（专利号ZL200520085766.0），将叶片下倾角度 $\alpha$ ，当叶片转动时是离心力平衡气动力和重力，使叶片根部的弯矩为零。从而明显改善叶片的受力状态，提高叶轮的使用寿命。

LF series big impellers are designed with the zero-moment patent (Patent number is ZL200520085766.0). The blade is designed downward angle  $\alpha$ , which can make centrifugal force of the blade compensate the aerodynamic force and gravity, then the bending moment at the foot of the blade equal zero. These patents improve the stress condition of blade, and lengthen impeller working life.

### 2. 力矩平衡 Blade moment balance

为满足大型叶轮的叶片具有可互换性的要求，我公司自主研发了力矩平衡平台。利用灵敏的质量传感系统采集数据，力矩平衡软件进行后台数据处理，在叶片的两个方向上进行力矩平衡，达到叶片力矩一致，从而保证同组叶片的互换性。

Moment balance platform is self-developed by our company to realize interchangeability of blades in large impeller. Make use of sensitive mass sensor to collect data, moment balance soft to process the data, and balance the blades on the two directions. Only the blades have the same moment, does the impeller get good balance level.

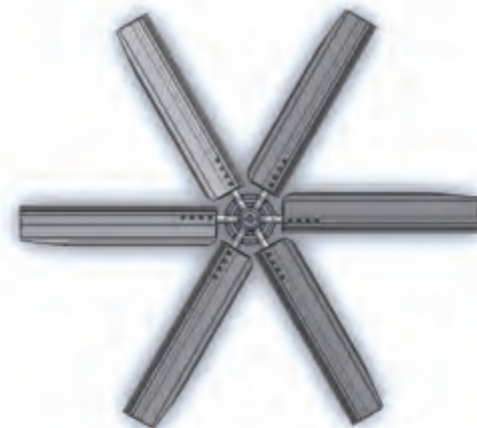


## 大叶轮规格 Big impeller configurations

### 1. 单盘式叶轮 Single-disc type impellers

单盘式叶轮主要用于直径6000mm以下，其主要结构配置如下表所述。

single-discs impellers are mainly used in diameter smaller than 6000mm. And the configurations of the impellers are as in the follow table.

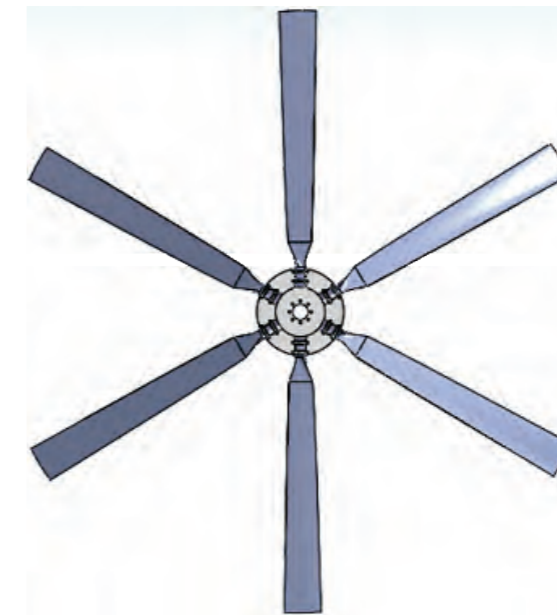


## 大叶轮规格 Big impeller configurations

直径Diameter (mm)	叶片Blade								挡风盘 Seal		叶片数Blade No.
	L1	L2	L3	L4	L6	L7	F1	F2	dic1	dic2	
$\Phi < 1500$	✓										3, 4, 5, 6
$1500 \leq \Phi < 2400$	✓	✓		✓	✓	✓	✓		✓		3, 4, 5, 6
$2400 \leq \Phi < 4700$		✓		✓	✓	✓	✓		✓		3, 4, 5, 6
$4700 \leq \Phi \leq 6000$		✓	✓	✓	✓		✓	✓		✓	3, 4, 5, 6, 7, 8

对于直径大于6000mm以上的单盘叶轮，配用铝合金安装座及U型螺栓装配，其主要配置如下：

For the impellers whose diameters are more than 6000mm are assembled by aluminum clamping and U bolts. And the configurations of the impellers are as in the follow table.



直径Diameter (mm)	叶片Blade						挡风盘 Seal		叶片数Blade No.
	L1	L2	L3	L4	F1	F2	dic1	dic2	
$6000 < \Phi < 8000$			✓			✓			6, 7, 8
$8000 \leq \Phi \leq 9754$			✓			✓			6, 7, 8, 10
$9754 < \Phi \leq 12192$			✓			✓			6, 7, 8, 10, 12

# 大叶轮规格 Big impeller configurations

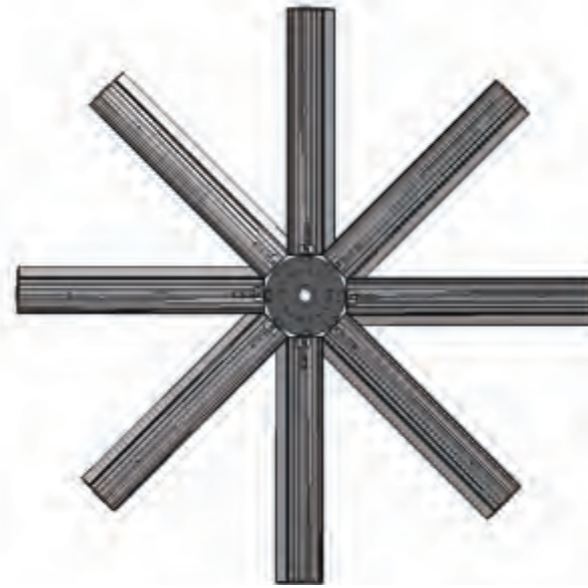
# 常用叶轮性能范围 General impeller performance range

## 2、双盘式叶轮

Double-discs type impellers

双盘式叶轮主要用于6000mm以上,其结构配置如下表。

Double-discs impellers are mainly used in diameter larger than 6000mm. And the configurations of the impellers are as in the follow table.

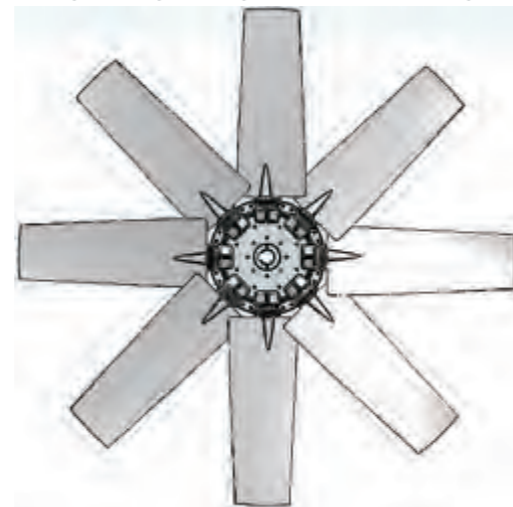


直径Diameter (mm)	叶片Blade						挡风盘 Seal		叶片数Blade No.
	L1	L2	L3	L4	F1	F2	dic1	dic2	
6000 <math>\Phi</math> <math>\leq</math> 8000			✓			✓			6, 7, 8
8000 <math>\leq</math> <math&gt;\phi&lt; &lt;math&gt;\leq&lt;="" 9754<="" math&gt;="" td=""> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>6, 7, 8, 10</td> </math&gt;\phi&lt;>			✓			✓			6, 7, 8, 10
9754 <math>\leq</math> <math&gt;\phi&lt; &lt;math&gt;\leq&lt;="" 12192<="" math&gt;="" td=""> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>6, 7, 8, 10, 12</td> </math&gt;\phi&lt;>			✓			✓			6, 7, 8, 10, 12

## 3、尼龙叶轮 PAG impeller

尼龙叶轮主要用于直径1830mm以下,其结构配置如下:

PAG impellers are mainly used in diameter larger than 1830mm. And the configurations of the impellers are as in the follow table.



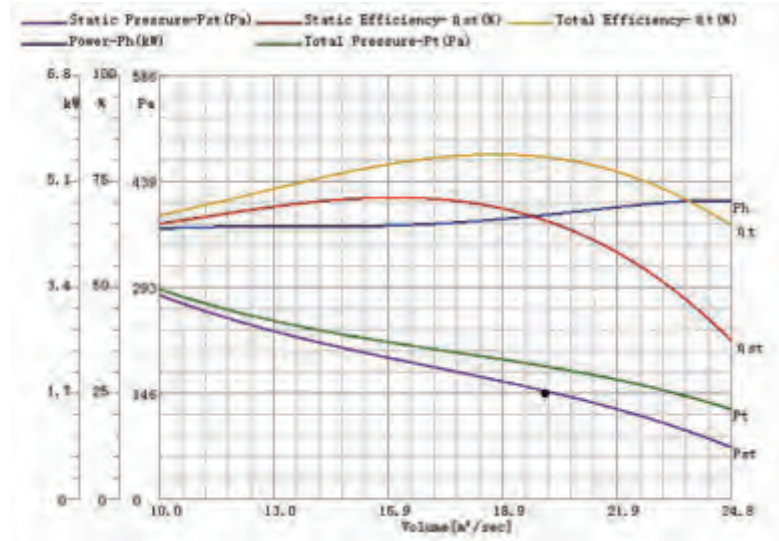
直径Diameter (mm)	叶片Blade						挡风盘 Seal		叶片数Blade No.
	N1	N2	L1	L2	F1	F2	dic1	dic2	
1000 <math>\leq</math> <math&gt;\phi&lt; &lt;math&gt;\leq&lt;="" 1250<="" math&gt;="" td=""> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3, 6</td> </math&gt;\phi&lt;>	✓								3, 6
1250 <math>\leq</math> <math&gt;\phi&lt; &lt;math&gt;\leq&lt;="" 1830<="" math&gt;="" td=""> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3, 4, 6, 8</td> </math&gt;\phi&lt;>	✓	✓							3, 4, 6, 8

- 下表中,给出了我公司常规叶轮的性能范围,详细的选型可使用我公司选型软件。  
The following table show the routine impeller performance range, and other selections can get from Creditfan selection soft.

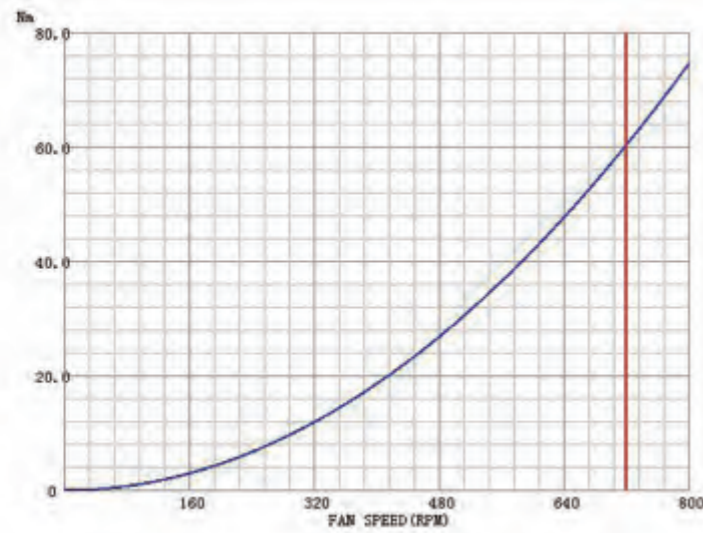
直径 Diameter (mm)	风量 Volume (m <sup>3</sup> /h)	全压 Total pressure (Pa)	最大转速 Max. speed (rpm)
1000	16000~42000	120~320	1300
1200	24000~61000	120~320	1100
1500	38000~95000	120~320	890
1600	43000~108000	120~320	830
1800	55000~137000	120~320	740
2000	68000~169000	120~320	660
2200	82000~205000	120~320	600
2400	97000~244000	120~320	580
2743	127000~318000	120~320	480
3048	157000~393000	120~320	440
3353	190000~476000	120~320	400
3600	219000~549000	120~320	372
3800	244000~612000	120~320	352
4000	271000~678000	120~320	335
4270	309000~772000	120~250	314
4500	343000~858000	120~250	298
4700	374000~936000	120~250	285
5000	420000~1050000	120~250	268
5500	510000~1280000	120~250	244
6000	610000~1220000	120~180	192
7000	830000~1660000	100~180	164
7700	1000000~2010000	100~180	149
8000	1080000~2170000	100~180	144
8500	1220000~2450000	100~180	135
9140	1410000~2830000	100~180	126
9754	1610000~3220000	100~180	95
10058	1710000~3430000	100~180	95
11278	2150000~4310000	100~180	85
12192	2520000~5040000	100~180	80

# 附录A Appendix A

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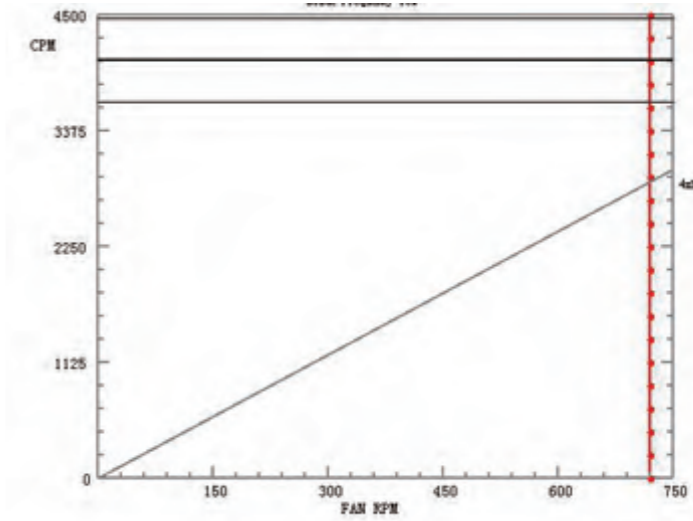


FanCurve

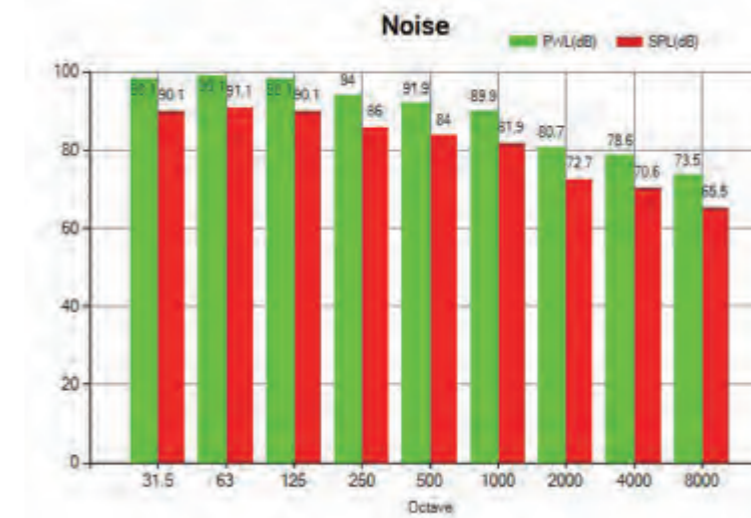


Torque

Impeller Model 1800-4-L1/31U  
All Data Must Be Approved By Creditfan



Campbell



Noise

Impeller Model 1800-4-L1/31U  
All Data Must Be Approved By Creditfan

# 附录A Appendix A



Customer Name: XXXX Note:  
 Job Name: XX  
 ROTOR MODEL: 1829-3-L1/31U Date: 2013-01-12 20:47:27

### CHARACTERISTICS

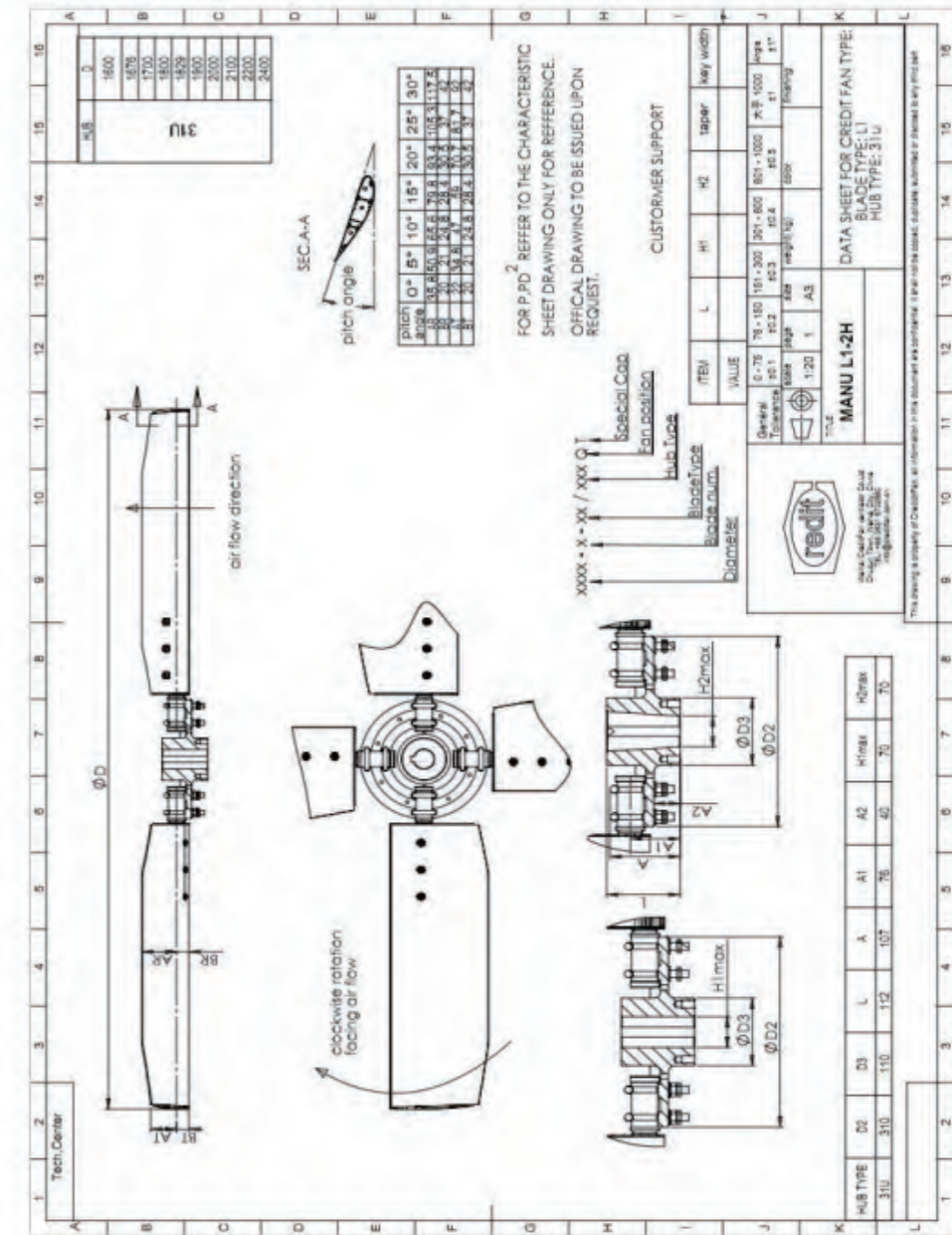
Required Volume	20.00 m³/sec	Required Static Pressure	150.00 Pa
Pressure Recovery	0 Pa	Fan Static Pressure	150 Pa
Velocity Pressure	33.32 Pa	Total Pressure	183.32 Pa
Air Temperature		Site Elevation	
Inlet Air Humidity (%)	%	Inlet Air Density	1.150 kg/m³
Fan diameter	1829 mm	Fan Ring Diameter	1847 mm
Blade Airfoil	L1	Impeller Hub Type	31U
Speed(RPM)	720 RPM	Blade Tip Speed	68.95 m/s
N. Blades	3	Blade Frequency	3924 cpm
Static Efficiency	62.8 %	Total Efficiency	76.7 %
Blade Pitch Angle	6.2 °	Impeller Shaft Power	4.78 kW
Pressure Margin (%)	104.95 %	Impeller Shaft Power@API Point	6.36 kW
Pressure Margin @API(%)	148 %	Inlet	Elliptical(Pse)
Volume Margin (%)	57.48 %	Installation Type	Forced
Tip Clearance/D	0.005	Impeller Rotal Weight	33.55 kg
Aerod Axial Force	482 N	Max Residual Unbalance	10.59 N
Impeller Inertia PD³	15 kg x m²	2 Blades Failure Load	13283 N
Blade Failure Load	13283 N		

### NOISE CHARACTERISTICS

PWL:	94.2 dB(A)		Inlet / outlet:		86.2 dB(A)				
SPL @:	1.0 m		Side:		73.8 dB(A)				
Octave [Hz]	31.5	63.0	125.0	250.0	500.0	1000.0	2000.0	4000.0	8000.0
PWL[dB]	98.3	99.3	98.3	94.2	92.1	90.1	80.8	78.8	73.6
Inlet/OutletSPL[dB]	90.3	91.3	90.3	86.2	84.1	82.1	72.8	70.8	65.7
SideSPL[dB]	77.9	78.9	77.9	73.7	71.7	69.6	60.4	58.4	53.2
Tolerance +/-	5.0	5.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0

Impeller Model 1829-3-L1/31U  
 All Data Must Be Approved By Creditfan

# 附录A Appendix A



Impeller Model 1829-3-L1/31U  
 All Data Must Be Approved By Creditfan

