Appliances Guide

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bigEE

Energy efficient fans

Country

China

Authors

Hu Bo/Zhao Feiyan

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1 Subtypes and markets

Typical size

The fans are classified into different categories according to size and shape of the fan blades. <GB/T 13380-2007 A.C. electric fans and regulator> sets the classification regulation of fans, which shows in the following table.

Table 1: Typical blade size of different fans

Types	Typical size (mm)
Table fans	200,230,250,300,350,400,450
Wall mounted fans	250,300,350,400,450
Standing fans	300,350,400,450,500,600
Ceiling fans	900,1050,1200,1400,1500,1800

Ceiling fans that are fixed on ceiling typically have the largest fan blades.

Main types of technologies

Fans can be classified as table fans, wall mounted fans, standing fans and ceiling fans based on the position that they are fixed. The portability of fans decides their application and usage. Most Chinese households use portable table and standing (pedestal) fans, while fixed wall mounted fans and ceiling fans are widely used in restaurants or commercial establishments.

Top10 collected the data of more than 100 fan models on Chinese market. About 69% of all fans are standing models and table fans have about 26% market share. Wall mounted and ceiling fans have 3% and 2% market share, respectively.

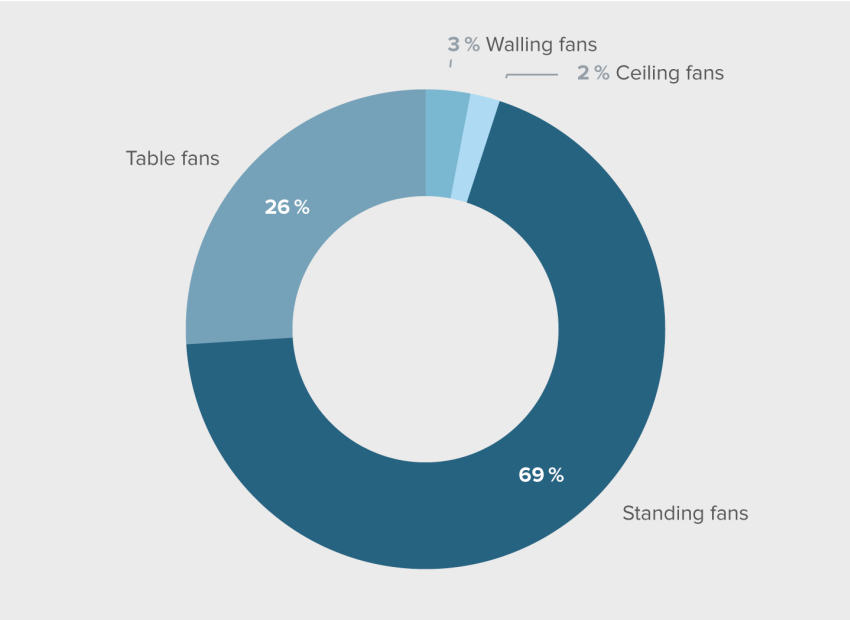

Figure 1: Market distribution of different fans

Current numbers for stock and market volumes

China produced 174 million fans in 2011, which increased about 7.9% compared to 2010. The domestic sale of fans in 2011 was about 39 million, increasing 75% compared to 2010. It is estimated that the market stock of fans in 2011 was about 137 million, which increased about 27.6 % compared to the market stock of 2010 [2].

2 Efficiency range and user savings

The following table gives a comparison between a typical inefficient appliance and the best available technology.

Level	**Typical Inefficient appliance. If MEPS is implemented: Appliance just complying to minimum requirement (MEPS)**	**Typical appliance purchased (BAU – Business As Usual)**	**Best Available Technology (BAT)**	**Typical appliance in the stock (over all appliances in use)**	**Expected future BAT (Best not yet Available Technology)**
Typical Capacity / Size	250 mm				
Category	**Table fan**	**Table fan**	**Table fan**	**Table fan**	**Table fan**
Lifetime (years)	10	10	10	10	10
Qualitative classification of the provided service (e.g.: washing performance /etc.)	☐ Poor ☑Low ☐ Average ☐ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☑Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☐ Good ☑Excellent ☐ No information	☐ Poor ☐ Low ☑Average ☐ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☐ Good ☐ Excellent ☐ No information
Yearly energy consump-	90kWh	75kWh	60kWh	68kWh	45kWh

tion ***Please precise the energy considered (electricity, gas,...): kWh***					
Purchase cost in (currency)	59	70	105	107	Not available
Operation & Maintenance cost	5	5	5	5	
Labelling class (for the aforementioned labels)	3	2	1	2	1

3 Performance and information requirements

Mandatory requirements

The first energy efficiency standard (EES) of fans was released in 1989. The latest revision was published in 2008, called <GB 12021.9-2008 Minimum allowable values of energy efficiency and energy efficiency grades for AC electric fans> [3]. <GB 12021.9-2008> sets three energy efficiency tiers based on the energy efficiency value. Tier 1 represents the most efficient model, whereas tier 3 sets the threshold for market access. Consequently, fans with an energy performance value below tier 3 are not allowed for sale on the market. The following table shows the energy efficiency requirements of different tiers.

Table 2: Energy efficiency requirements of different tiers

Fan types		**Fan pages (mm)**	**Energy efficiency value/[m^3/(min. W)]**		
			Energy efficiency tiers		
			1	**2**	**3**
Table fans, wall mounted fans and standing fans	Capacitance fan	200	0.71	0.60	0.54
	Shaded pole fan		0.63	0.51	0.45
	Capacitance fan	230	0.84	0.70	0.64
	Shaded pole fan		0.65	0.57	0.50
	Capacitance fan	250	0.91	0.79	0.74
	Shaded pole fan		0.72	0.61	0.54
	Capacitance	300	0.98	0.86	0.80

	fan	350	1.08	0.95	0.90
		400	1.25	1.06	1.00
		450	1.42	1.19	1.10
		500	1.45	1.25	1.13
		600	1.65	1.43	1.30
Ceiling fans	Capacitance fan	900	2.95	2.87	2.75
		1050	3.10	2.93	2.79
		1200	3.22	3.08	2.93
		1400	3.45	3.32	3.15
		1500	3.68	3.52	3.33
		1800	3.81	3.67	3.47

According to the market research of Top10, tier 1 fans take 76%, tier 2 fans 20% and tier 3 fans take the remaining 4% market share. Since tier 1 has an overwhelming market share, the EES needs to be revised.

Minimum Energy Performance Standards (MEPS)

The MEPS of fans was set in <GB/T 13380-2007> which is based on the different types and the page size.

Table 3: Minimum energy performance values of different fans

Fan page size (mm)	**Minimum energy performance values [m^3/(min. W)]**							
	Table fans		**Walling fans**		**Standing fans**		**Ceiling fans**	
	Shaded pole	Capacitance	Shaded pole	Capacitance	Shaded pole	Capacitance	Shaded pole	Capacitance

	fans	fans	fans	fans	fans	fans	fans	fans
200	0.54	0.45						
230	0.64	0.50						
250	0.74	0.54	0.74	0.54	0.80			
300	0.80		0.80		0.90			
350	0.90		0.90		1.00			
400	1.00		1.00		1.10			
450	1.10		1.10		1.13			
500					1.30			
600								
900							2.75	1.90
1050							2.79	2.16
1200							2.93	2.47
1400							3.15	2.55
1500							3.33	2.70
1800							3.47	2.77

Mandatory labelling

The mandatory energy efficiency labelling of fans started in 2008 and is based on <GB 12021.9-2008>. Fans that exist on the market must have the energy label, displaying information related to the energy efficiency value and rated power.

Figure 2: Energy efficiency label sample of fan

Voluntary requirements

The voluntary energy conservation certification of fans started in 2009, which is now implemented by China Qualification Centre (CQC), based on <Energy Conservation Certification Rules of AC Electric fans> [4].

Tier 2 for energy efficiency is the threshold of energy conservation certification of fans. Fans of tier 1 and 2 can use the energy conservation label after application to CQC.

Figure 3: Energy conservation label sample

4 Test procedures and standards

<GB/T 13380-2007 A. C. electric fans and regulators> defines the energy efficiency parameters and test method of fans. This standard is based on <IEC 60879: 1986 Performance and construction of electric circulating fans and regulators>. The ratio between tested air flow (m^3/min) and tested input power (W) of motor when the fan runs on the rated fastest speed is set as the energy efficiency indicator of the fan in <GB/T 13380-2007>. This indicator is named energy efficiency value.

The input power is tested after the fan runs for half an hour at the fastest speed. If the fan provides a swing function, it must be turned on during the testing.

5 References

[1] <GB/T 13380-2007 A.C. electric fans and regulators>.

[2] CNIS (2012): China National Institute of standardization: White paper for the energy efficiency status of China energy-use products.

[3] <GB12021.9-2008 Minimum allowable values of energy efficiency and energy efficiency grades for AC electric fans>.

[4] CQC (2009): Energy Conservation Certification Rules of AC Electric fans.

[5] CNIS (2012): China National Institute of Standardization. Online: http://www.energylabel.gov.cn.

[6] CQC (2010): China Quality Certification Centre. Online: htttp://www.cqc.com.

[7] ETAO (2015): Online: http://www.etao.com.

[8] http://www.zol.com.cn.