

Fan test

Erp 2013 and 2015 (EU-regulation no. 327/2011)

With the purpose to reduce the energy consumption in the EU with 20% before 2020 all fans that are used must among other things meet the minimum demands regarding efficiency.

Following operational conditions must not meet the EU-demands:

- ATEX
- Air transport above 100°C
- If the air that surrounds the motor is above 65°C
- If the air to be transported is below -40°C
- If the supply voltage is > 1000VAC or > 1500 VDC
- Works in toxic, heavily corrosive or flammable environments or environments with abrasive substances
- If pressure ratio is larger than 1.11
- Transport fans for the transport of non-gaseous substances in industrial process applications
- Electric input power outside the area 125Watt - 500kW

In connection the implementation of EU-regulation no. 327/2011 following 14 points must be stated in the fan technical documentation:

1. Overall efficiency

Data will be stated on brochure page in section 3.

2. Measurement category used

TYPE D (fan with connected pipes on inlet and outlet)

3. Type efficiency category

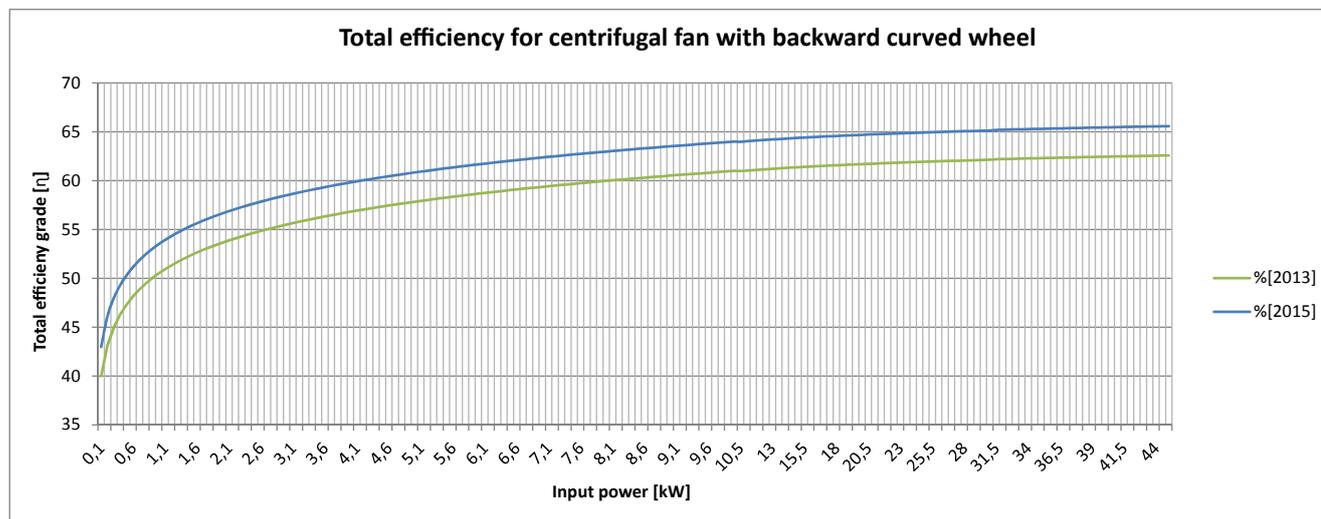
TOTAL (efficiency measured in relation to total pressure above fan)

4. Efficiency grade (N)

N = 61

Fan type	Environmental category (A-D)	Efficiency category (static or total)	Power range (P) in kW	Target energy efficiency	Efficiency grade (N) Per 1.1. 2013	Efficiency grade (N) Per 1.1. 2015
Centrifugal backward curved fan with housing	B, D	Total	$0.125 \leq P \leq 10$	$\eta_{\text{target}} = 4.56 * \ln(P) - 10,5 + N$	61	64
			$10 < P \leq 500$	$\eta_{\text{target}} = 1.1 * \ln(P) - 2,6 + N$		

To take the electro motor dissimilarity into account the following curves show the efficiency grades that are demanded as minimum:



5. Fan dependent on frequency converter

All fans except fan type VP 1600 60Hz are tested without frequency converter.

Test performed at voltage 3x400V and frequency 50Hz.

Fans that are not dependent on frequency converts are marked No-VSD.

Fans that are dependent on frequency converts are marked Yes-VSD.

(VSD stands for "Variable Speed Drive")

6. Year of manufacture

Manufacture year will be stated on fan marking.

7. Name of manufacture

Gram Clean Air A/S
Lysbjergvej 10, Hammelev
DK-6500 Vojens

VAT no. DK36831812

8. Product type

Product type will be stated on brochure page.

9. Rated motor power input, flow rate and pressure at optimum energy efficiency

Data will be stated on brochure page.

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10. Rotations per minute at optimum energy efficiency

Data will be stated on brochure page.

11. Specific ratio

Pressure ratio is a calculated ratio between pressure on inlet and outlet side of fan.

Factor is between 1.0 and 1.11 for fans that are included in the regulation. This will be stated on the brochure page.

12. Disassembly and disposal

Before disassembling you must take care that the room is well ventilated and suitable personal protection must be used:

- Protection clothing
- Approved gloves
- Full face mask respirator with approved filter

Electro motor is disassembled and disposed as WEEE (Waste Electrical and Electronic Equipment).

The rest of the fan is disposed as steel scrap.

After finished dismounting the work area is cleaned with suitable vacuum cleaner.

13. Minimise environmental impact as well as ensuring optimal life expectancy as regards installation, use and maintenance

To obtain optimal conditions for the fan the following is important:

Vibrations

- Ensure that no unusual vibrations occur
- Ensure optimal vibration isolation of fans
- Ensure that fan wheel is without dirt and in balance

Noise

Mechanical noise and channel noise should be reduced to a minimum in order not to have an impact on the surroundings.

To dimensioning the optimum noise reduction exact frequency band measurements can be stated regarding the mechanical noise and channel noise of the fan. This information can be requested on sales@GramCleanAir.com for the operational point in question.

Unwanted noise can easily occur in channel connections and flexible connections - especially at leakages. This should be reduced to a minimum.

Energy consumption

It is very important only to extract the necessary air volume at the necessary vacuum to reduce the energy consumption. This can be regulated with a regulating damper, but move optimal with the use of frequency converters with PID-regulation.

Leakage in piping as well as pollution in piping will always cause increased energy consumption as well as possible noise.

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Electro motor surface must all times be kept clean, and cooling air access may not be hindered, since this will increase the energy consumption.

Extracted air from a heated room may not exceed the necessary air flow, as well as the use of a heat exchanger can reduce the energy consumption of the complete unit.

14. Laboratory measurement mounting

Measurement mounting according to ISO 5801 type D with instruments with the required classifications.

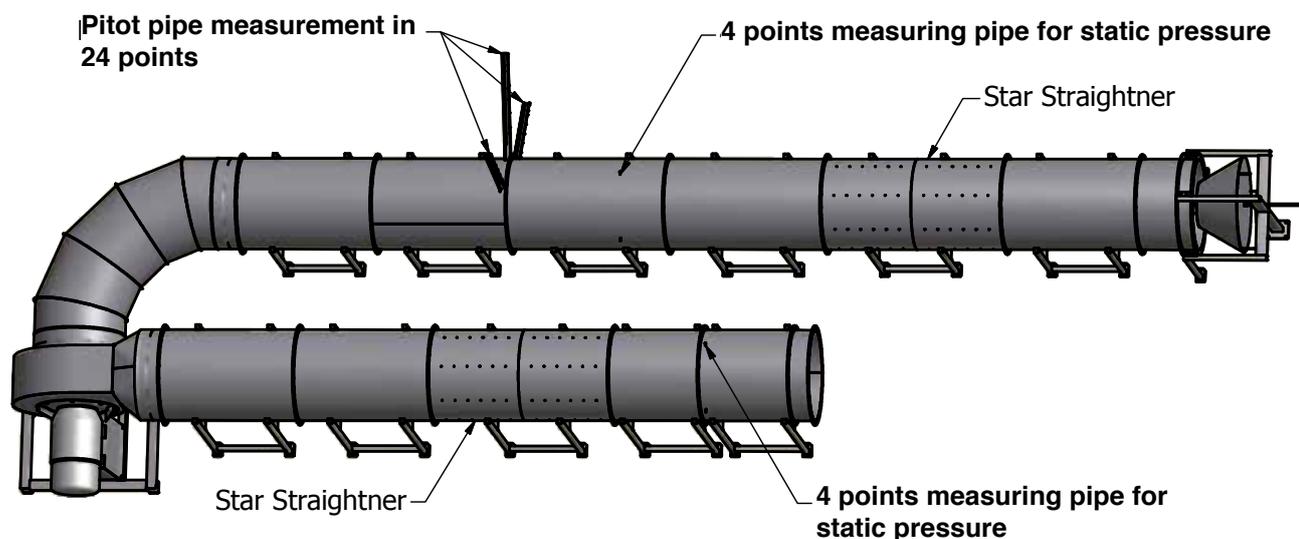
For further information regarding measurement mounting - se section regarding fan test at Gram Clean Air A/S.

IMPORTANT!

If parts are repaired/replaced with unoriginal parts, the fan must be tested again according to be above ErP-regulation no. 327/2011 and ISO 5801 for legalization. A such test cannot be performed on the spot, but can only be performed in a laboratory.

Testing of fans

To obtain identical measuring results ISO 5801 must be followed. At Gram Clean Air A/S this is met by using following depicted test mounting, which is found in 4 different versions at Gram Clean Air A/S for use at different air flows:



Our fans have been tested in a mounting with pipes both mounted on inlet and outlet. Air flow is regulated with the help of a conical damper in inlet channel.

The used measuring instruments are all instruments that meet the very strict demands in ISO 5801. Further there has been corrections for meteorological conditions.

Noise measurements

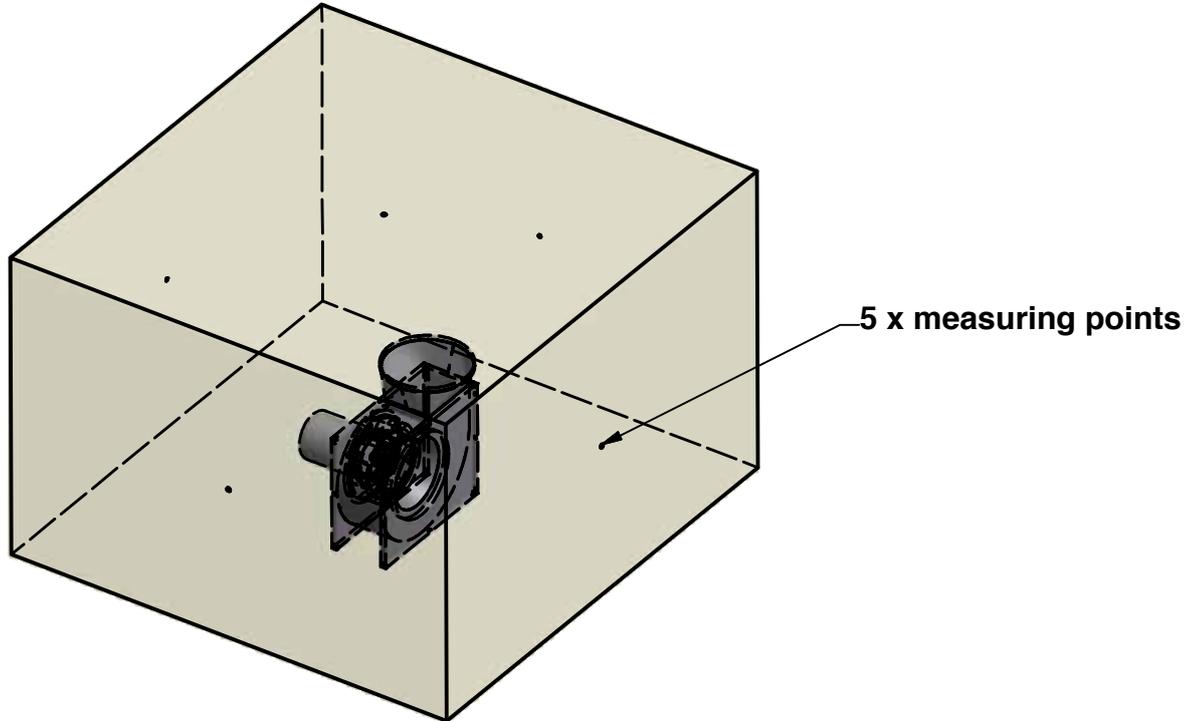
Besides efficiency grade test also a noise test has been performed. Noise measurements are performed according to ISO 3746 with the help of a "shoe box" with a distance to the subject of 1 meter. At the same time a meas-

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Measurement in the outlet has been made.
Noise measurements are made with pipe connections on the fan.

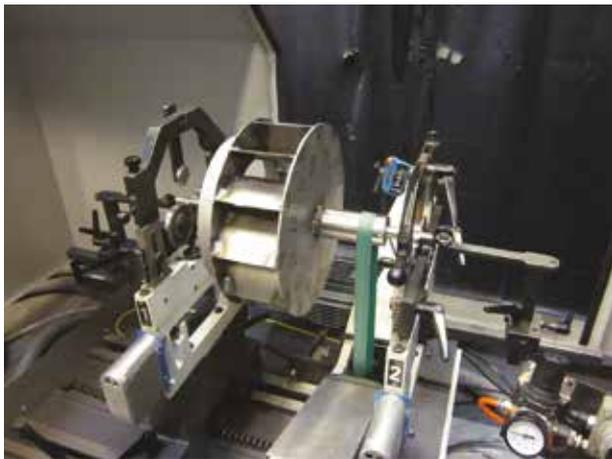
At inquiry to sales@GramCleanAir.com we will be able to state noise data in frequency band at a required air flow.
With frequency band a noise damping can be dimensioned.

Drawing below shows principle for fan noise measurement with 5 points called "shoe box".



Balancing

Balancing of fan wheel is done according to ISO 14694, where measurements are stored electronically and test number is stated on the cooling shield of the fan in question (BV3 G 6,3).



Fan wheel in balancing machine



Screen photo for balancing machine