Italian position on the scope of the
Working Document for an ecodesign measure on fans

Italy welcomes the efforts of the Commission and ask for a rapid implementation of the ecodesign criteria and new labelling scheme for fans as a way to foster energy efficiency and contribute to the saving energy targets set by the EU.

However Art. 1 **subject matter and scope** of the legislation under preparation "*fans driven or designed to be driven by motors with an electric input power between 125 W and 500 kW, including those integrated in other products*" needs to be clarified and revised in order to univocally identify products/equipments that are meant to be covered and those that we consider inappropriate for inclusion, such as domestic cooker hoods.

1) Cooker Hoods

Italy is in favour of improving the efficiency of cooker hoods (in the following simply "hoods") by removing from the market less efficient appliances. In particular Italy fully supports the approach of introducing minimum requirements and a mandatory energy label for hoods, as suggested by the ecodesign preparatory study *Lot 10 "Air conditioning appliances (air conditioners and ventilation)*", including also cooker hoods.

Hoods total production in Europe in 2009 was about 8,5 millions units. "Built-under" and "built-in" models account for approximately 60% of the total, while "chimney" and "design" hoods (i.e. free-standing products) accounts for the remaining 40%.



Built-under



Built-in



Chimney



Design

Free-standing

Hoods power ranges from about 90W to 350W, therefore part of the hoods production would be included into the scope of the fans ecodesign Regulation, but products in the range the 90-125 W, will be excluded. These products are also the less efficient part of the market.

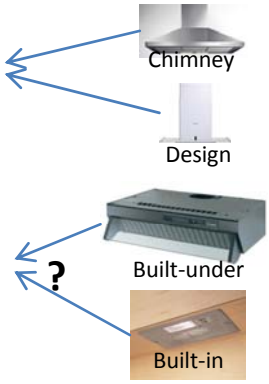
The Commission Working Document on fans is based on the preparatory study *Lot 11* "F*ans for ventilation in non residential buildings*", focused on product categories typical of non-residential buildings, as clearly explained in the following Table (taken from Lot 11 Final Report, page 21). This classification fits very well for non-residential ventilation

products and equipments, but leaves room for interpretation when domestic hoods are considered. For the following part of this document we will assume that free-standing hoods are within "centrifugal-forward curved blades with casing" fans, while built-under and built-in appliances are within "box fans" (see Figure below).

Table 11: Definition of product categories for ventilation fans (non-residential buildings)

Product Category	Direction of flow	Type	Typical Sizes [mm]	Example
1	Axial	<= 300 Pa (static pressure)	200 - 1,400	 Source: Helios
2		> 300 Pa (static pressure)	200 - 1,400	
3	Centrifugal	forward curved blades (with casing)	120 - 1,600	 Source: Nicotra
4		backward curved blades (no casing)	120 - 1,600	 Source: ebmpapst
5		backward curved blades (with scroll housing)	120 - 1,600	 Source: Ziehl-Abegg
6	Other	Box fans	100 - 1,000	 Source: Fläktwoods
7		Roof fans	250 - 1,000	 Source: Gebhardt
8		Cross-flow fans	60 - 120	 Source: ebmpapst

Note: Size refers to impeller diameter except for box fans where it refers to spigot size.



A clear classification of hoods within the fans categories is necessary in order to understand which of the specific ecodesign requirements proposed in the Working Document may apply.

Since Lot 11 focused on product for non-residential buildings, a detailed analysis was developed on fans for non residential use, resulting in a very detailed and comprehensive product segmentation. Unfortunately the energy efficiency and power distribution of fans for cooker hoods fall in an area below that of the investigated non-residential products, as shown in the following Figure, where the red circle represents the approximate distribution of the static efficiency over electrical power for hoods within non-residential centrifugal fans and box fans (under the previous assumption that built-under and built-in hoods can be classified in Category 3 centrifugal fans).

The two Figures below shows also that the minimum efficiency requirements for free-standing hoods have been extrapolated from – potentially - similar non residential fans (centrifugal type) with much larger dimensions as well as air output pipes. The same applies to built-in and built-under hoods, whose minimum requirements have been extrapolated from non residential box fans. No specific analysis was developed within Lot 11 study.

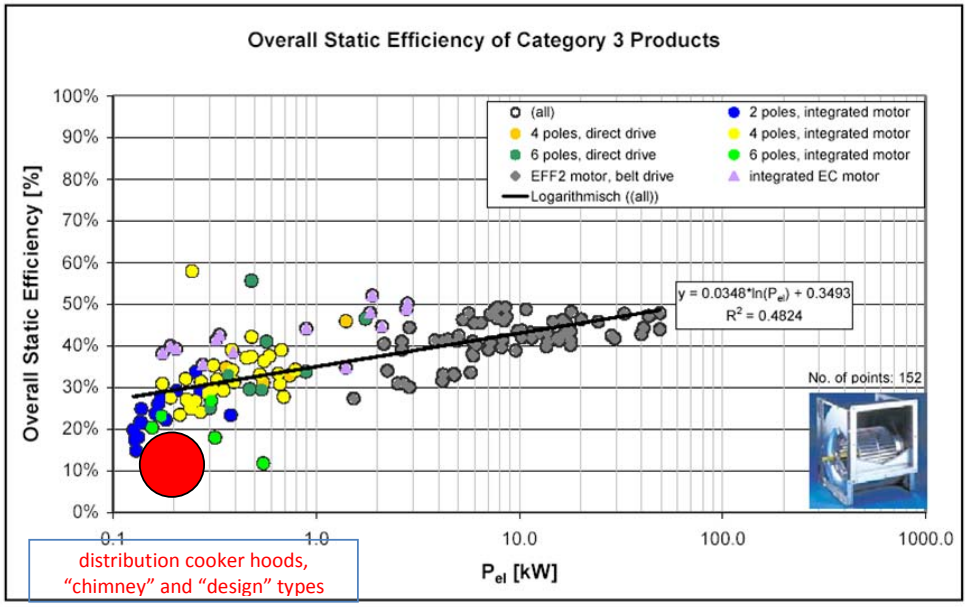


Figure 53: Overall static efficiency over electrical power input of existing category 3 fan products (centrifugal fans, forward curved blades, with housing)

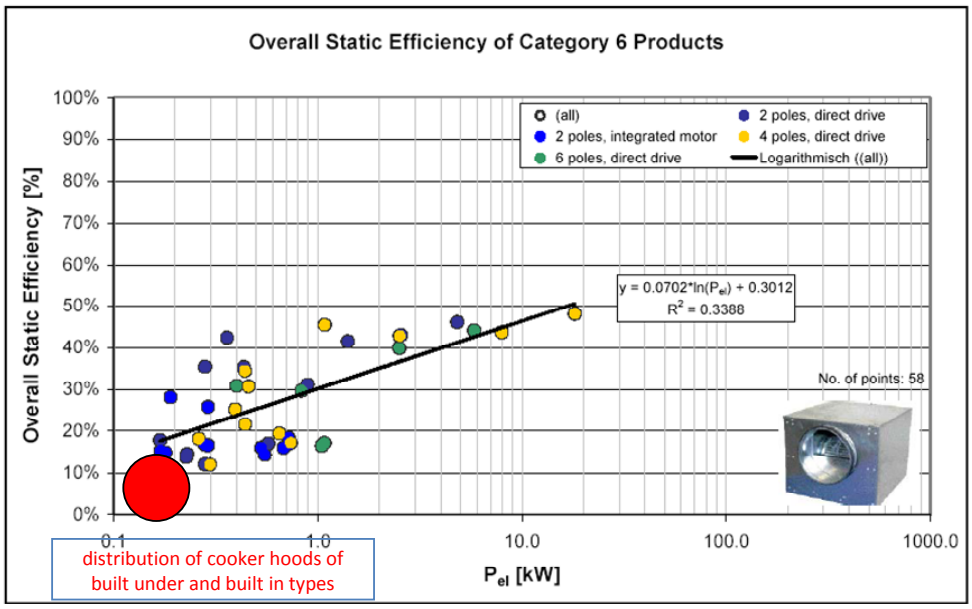
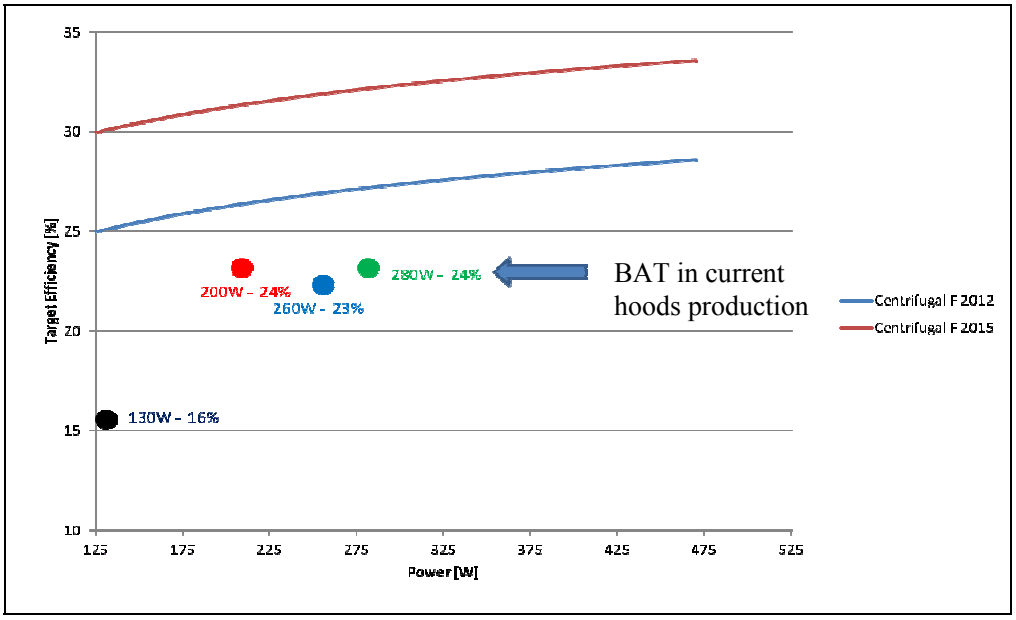


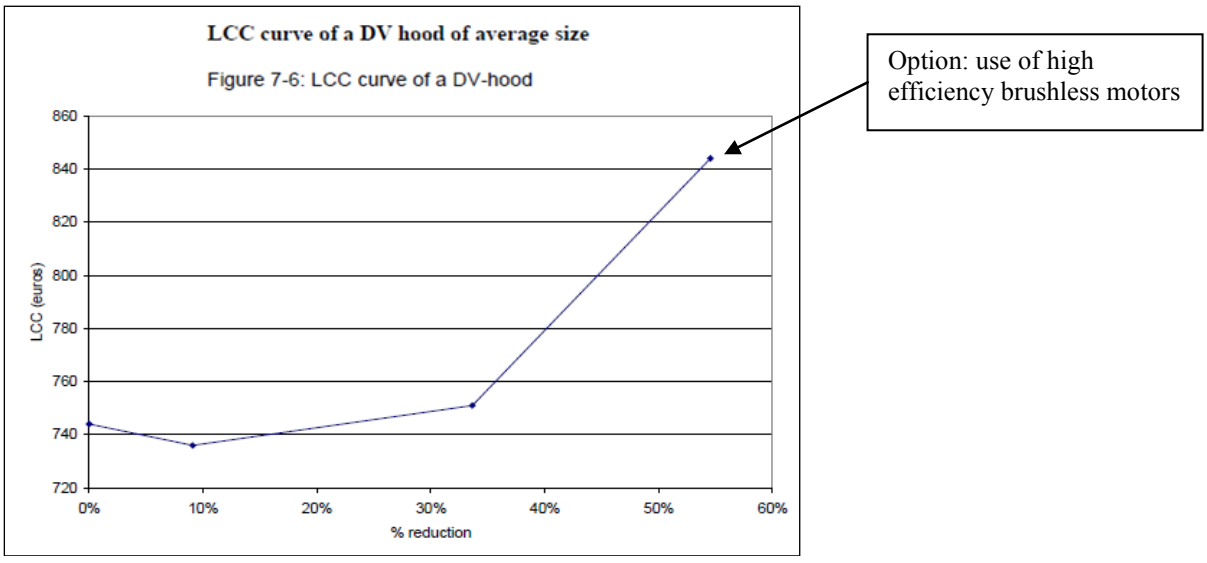
Figure 56: Overall static efficiency over electrical power input of existing category 6 fan products (box fans)

Considering in detail the specific ecodesign requirements proposed by the Working Document other elements of concern arise.

For "chimney" and "design" hoods (when considering them centrifugal fans) the Figure below shows that the proposed efficiency limits for 2012 and 2015 are much higher than the current BAT for hoods of different power.



Free-standing type hoods could comply with the specific efficiency limits proposed in the Commission Working Document only when incorporating high efficiency brushless motors. However, considering the specific Least Life Cycle Cost analysis made in Lot 10 Final Report (pag.128) this technological option is largely beyond the LLCC.



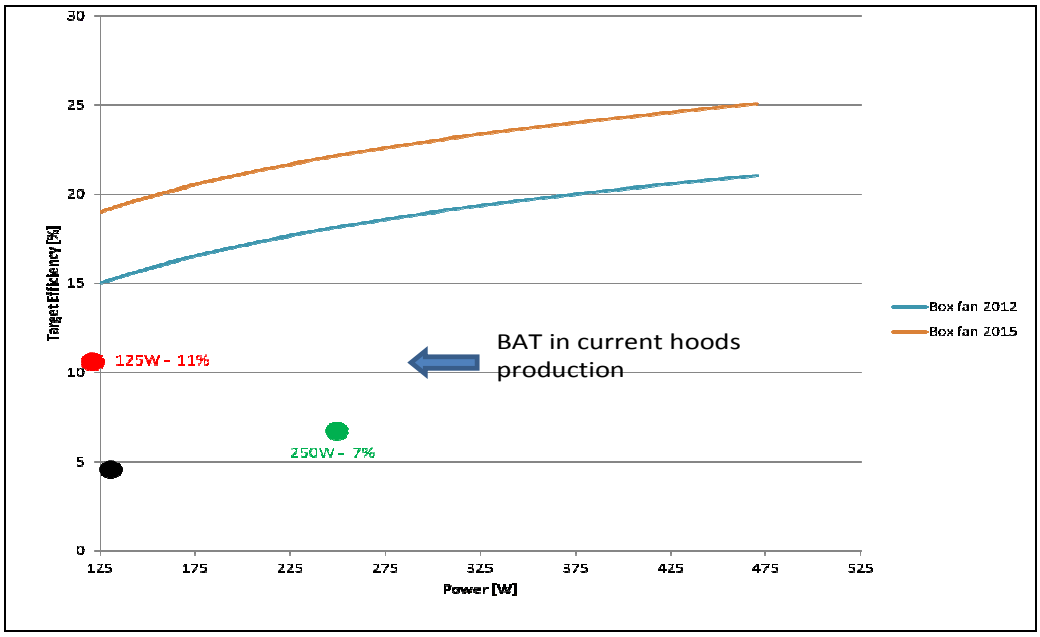
In fact, the Energy Efficiency Index at *part load* at the LLCC points is 9, corresponding approximately to a value of 16 when the blower efficiency only and the full load are considered (as in Lot 11 study). But the specific efficiency limits proposed in the Working Document are close to 28 in 2012 and 33 in 2015, that is almost the double the BAT value. We therefore consider that the mandate of the ecodesign directive to set minimum requirements around the LLCC point has been widely exceeded for free-standing hoods.

This conclusion is supported by the values in the Table below, taken from Final Report

(pag.131) of Lot 10, showing how the efficiency requirements proposed in the Commission Working Document are more suitable for central ventilation products, than for cooker hoods.

EEI at PL	"Local ventilation"=DV	« Hoods »	"Central ventilation"=ICV
BAU	2	6	12
LLCC	3	9	24
BAT	>3 (estimated 4)	>15 (estimated 18)	>30 (estimated 38)

When the same analysis is developed for "built-under" and "built-in" hoods (under the assumption that they can be classified as box-fan) the Figure below shows that all the production is far below the proposed ecodesign limits, and we are not aware of any possible technical solution that could increase the efficiency to the requested minimum threshold. As consequence, both "built-under" and "built-in" hoods will be inevitably phased out from the market, leaving consumers with no replacement possibility nor with any suitable alternative product for their kitchen.



Even when considering the problem from a purely theoretical point of view no solution to improve built-in/built-under hoods efficiency can be hypothesised. In fact, the efficiency of a fan for a cooker hoods is given by the combination of the efficiency of the motor and the efficiency of the blower:

$$\acute{\eta}_{tot} = \acute{\eta}_{mot} \times \acute{\eta}_{blow}$$

where:

- $\acute{\eta}_{motor}$ = 20% (if shaded poles motor), 50% (if AC capacitor motor), 80% (if EC brushless motor)
- $\acute{\eta}_{blower}$ = 50% (if centrifugal blower), 25% (if built under/ built in blower)

therefore the maximum theoretical value attainable would be 20%. This is an hypothetical value that in real application becomes lower due to dimensional and design constraints of the built-in/built-under products. A good explanation of the reduced efficiency of small blowers is given in Lot 10 (page 116):

In practice, axial flow fans are frequently of the tube-axial type (i.e., without guide vanes). The rotational energy at the outlet is lost and real efficiency on blowing systems is often moderate. Replacement by, or modification to, the vane-axial alternative should give a higher usable efficiency.
The axial fans of 100 to 150 mm diameter can hardly reach 20% mechanical efficiency with present geometry, often less because of manufacturing constraints deriving from cost objectives.
The centrifugal impellers are forward curved. Transition to backward curved impellers is seen as costly by the stakeholders in residential applications since the higher speed needed (for instance 2000rpm instead of 1000 rpm for the same flow) necessitate a strong acoustic treatment, far more than what is done for the medium range products.
The smaller and cheap mass-produced centrifugal fans with ladder strip impellers (forward) often can hardly achieve 60% with an evenly distributed flow. It is possible that backward curved impellers permit a higher performance like 70%, or at least the same.
When forward curved rotors are put in situation of "lateral fixing" where the motor opposes to air distribution the flow is poorly distributed on the blades and some stakeholders have estimated the efficiency to 40% or less.

Unfortunately, Lot 11 analysis does not take in consideration these basic aspects of cooker hoods.

Conclusions

Italy strongly supports the increasing in efficiency for cooker hoods, but we deem that the Commission Working Document, based on the analysis for ventilation products for non-residential buildings (Lot 11) does not appropriately considers household ventilation and air conditioning products such as cooker hoods. The following critical elements have been identified:

- Hoods with power from 90W to 125W will be excluded from the ecodesign legislation under preparation, but these products represent the less efficient appliances on the market;
- Hoods classification: the proposed fans classification fits very well for non-residential ventilation products and equipments, but leaves room for interpretation when domestic hoods are considered;
- Minimum efficiency requirements for both free-standing and built-in/built-under hoods have been extrapolated from – only potentially - similar non residential fans, with much larger dimensions as well as air output pipes. No specific analysis was developed within Lot 11 study. In particular:
  - The mandate of the ecodesign directive to set minimum requirements around the LLCC point has been widely exceeded for "chimney" and "design" hoods.
  - For both "built-under" and "built-in" hoods no technical solution is known allowing to increase the efficiency to the requested minimum threshold. As

consequence these products will be phased out from the market, leaving consumers with no replacement possibility nor with any suitable alternative product for their kitchen.

On the basis of the above considerations Italy recommends the exclusion of cooker hoods from the scope of the current draft ecodesign measure on fans.

Italy also recommends that a specific set of policy measures (specific ecodesign requirements and labelling scheme), addressing the whole products on the market, is defined as soon as possible for cooker hoods, based on the outcome of Lot 10 study:

Table 8-1: Efficiency classes proposed for consistency of grading of residential ventilation fans based on EEI at Part Load (the EEI is shown for the average size product)

Classes	"Local ventilation" of average size, non cent. P = 17W	« Hood » of average size = 150W	"Central ventilation" of average size = 75W
Reminder: value of BAT	4 (more than 3)	18 (more than 15)	38 (more than 30)
"Highest" or A	EEI@PL>6	EEI@PL>18	EEI@ PL >38
B	6>=EEI@PL>5	18>=EEI@PL>15	38>=EEI@PL>31
C	5>=EEI@PL>4	15>=EEI@PL>12	31>=EEI@PL>24
LLCC or D	4>=EEI@PL>3	12>=EEI@PL>9	24>=EEI@PL>17
"Just above average" or E	3>=EEI@PL>2	9>=EEI@PL>6	17>=EEI@PL>12
F	2>=EEI@PL>1	6>=EEI@PL>3	12>=EEI@PL>6
"Lowest" or G	EEI@PL=0 or 1	3>=EEI@PL	6>=EEI@PL

The grading scale has a wide extent, with an empty class A, and there is no reason to forecast any change in it before 2015, at the soonest.

2) <u>Random impact on domestic air conditioners</u>

Due to the minimum power threshold of 125W, domestic air conditioners will be randomly affected: for some models only the fan of the external unit will fall under the scope of the fans Regulation, for other models only the fan of the internal unit will be affected, but most of the models will be out of the scope of the proposed fans Regulation.

Considering that:

- (i) unlike other products, the energy consumption of the fans (one or both) is a very minor component of the annual energy consumption (or efficiency) of air conditioners
- (ii) the application of the proposed minimum requirements for fans would in practice result in no energy saving and in a contemporary raise of severe design constraints for some domestic air conditioner models (optimisation of air ducts for fan efficiency optimisation and not for air conditioning efficiency optimisation).
- (iii) the production of models with fans covered by the proposed fans Regulation will be very likely discontinued in order to avoid the Regulation burden, with the risk that efficient air conditioners will be discontinued

- (iv) a set of ecodesign/labelling Regulation is under preparation by the Commission, based on the ecodesign preparatory study *Lot 10 "Air conditioning appliances (air conditioners and ventilation)*", where the fan efficiency could be if necessary taken into consideration and better tuned for the specific product

Italy recommends the exclusion of fans in domestic air conditioners from the scope of the draft ecodesign Regulation.

3) <u>Further inconsistencies in Art.1 subject matter and scope</u>

Art. 1(2)(c): the temperature criteria for fans exclusion are not fully understandable:

<u>(i.a) operating temperatures of the gas being moved exceed 100ºC</u>: is this temperature threshold the absolute minimum achievable by the gas being moved or one of the possible operating temperatures of the products? In this respect:

- are (industrial/domestic) ventilated ovens excluded because one of the operating temperature of the air being moved is very likely higher than 100°C or are such ovens included because the temperature of the air being moved can be sometimes lower than 100°C?
- what about (industrial/domestic) ventilated desiccators, where the temperature of the air being moved can be higher than 100°C?
- How can be this temperature requirement being verified for market surveillance purposes?

Note: an ecodesign preparatory study is on-going for ovens (including desiccators)

<u>(1.b) operating ambient temperature for the motor … driving the fan exceeds 40°C</u>: is the mentioned "ambient temperature" the temperature of the room where the overall equipment is located) or the temperature of the motor housing (if any)?

<u>(ii) annual average temperature of the gas being moved and/or the operating ambient temperature for the motor, if located outside the gas stream, are lower than -15ºC</u>: this provision apparently excludes fans in ventilated tunnels for food freezing in food industry, but what about fans for ventilated professional/industrial refrigeration (average temperature +3/+10°C) equipments or in blast chillers again in food industry (average annual temperature higher than -15°C), provided the motor driving the fan exceeds 125W?

Note: blast chilling is the process of quickly dropping the core food temperature to maintain the taste/nutrition characteristics unchanged and to prevent bacterial proliferation. Temperature drop can be from +70° C to +3° C or from +70° C to -18° C

Rome, 23 march 2010.

Article 1

Subject matter and scope

1. This Regulation establishes ecodesign requirements for the placing on the market or putting into service of fans driven or designed to be driven by motors with an electric input power between 125 W and 500 kW, including those integrated in other products.

2. This Regulation shall not apply to fans with an electric input power between 125 W and 500 kW which are:

   (a) designed to operate in potentially explosive atmospheres as defined in Directive 94/9/EC[1];

   (b) designed for emergency use only, at short-time duty, with regard to fire safety requirements set out in Directive 89/106/EC[2];

   (c) designed to operate:

      (i) a.where operating temperatures of the gas being moved exceed 100ºC;
      b. where operating ambient temperature for the motor, if located outside the gas stream, driving the fan exceeds 40°C;

      (ii) where the annual average temperature of the gas being moved and/or the operating ambient temperature for the motor, if located outside the gas stream, are lower than -15ºC;

      (iii) with a supply voltage >1 000 V AC or >1 500 V DC;

      (iv) in toxic, highly corrosive or flammable environments or in environments with abrasive substances.

      (v) with an optimum energy efficiency at 8000 rotations per minute or more;

      (vi) in applications in which the ratio of the discharge pressure over the suction pressure is over 1.11;

      (vii) in tumble and washing dryers.

[1] OJ L 100, 19.4.1994, p. 1.

[2] OJ L 40, 11.2.1989, p. 12.