

## D2.2 - Topten ACT Criteria Paper:

### Tumble driers

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**Topten ACT** aims at transforming the European market of energy-using products towards higher energy efficiency.

Topten ACT identifies the top energy-efficient products in 16 European countries, and makes this information available to consumers and large buyers on tailored national websites. The most energy efficient models in different product categories (such as household appliances, lighting, office equipment, consumer electronics, cars) are presented with comprehensive product information based on official labels and standardized declarations. Topten works with manufacturers and thus increases both market offer and consumer demand of high energy efficiency products. Topten is strictly neutral and independent from manufacturers and retailers, its selection criteria are always published online.

Topten ACT is supported by the European Commission's research and innovation programme Horizon 2020, and many national organisations (energy agencies, environmental and consumer organisations, research institutes). The Topten ACT project involves 17 partners in 16 European countries. It is coordinated by ADEME (Agence de l'Environnement et de la Ma trise de l'Energie).

More information and access to all national websites on the European site: [www.topten.eu](http://www.topten.eu)

WP2 European Product Analysis , Task 2.1 Determining energy efficiency criteria, D 2.2 Periodic Criteria Papers (second set)

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## 1. Topten.eu: tumble driers current selection criteria and products selected

Topten presents three categories of tumble driers:

- Tumble driers for residential use: driers designed for one apartment (capacity 7kg - 9kg)
- Tumble driers for semi-professional use: driers designed for several apartments (community laundry), with a usage intensity about 5 times the usage of residential driers
- Tumble driers for professional use

Topten.eu selection criteria:

	<b>Residential driers</b>	<b>Semi-professional driers</b>	<b>Professional driers</b>
Energy efficiency	Class A+++	Class A++ or A+++	Heat pump driers
Condensation efficiency	Class A	Class A	

Semi-professional driers are a Swiss specialty: these are used in common laundry rooms in multi-apartment buildings. They are constructed more robust for high-intensity usage. For professional driers there is no Energy Label. As for residential driers, Topten.eu lists only professional driers with heat pump – to date only these reach efficiency levels < 0.3 kWh/kg.

Number of tumble driers currently on Topten.eu according to capacity (August 2018):

### Residential driers

Energy / condensation efficiency	7kg	8kg	9kg	Total
A+++/A	5	13	4	22
Total	5	13	4	<b>22</b>

### Semi-professional driers

A+++/A	-
A++/A	6
Total	<b>6</b>

### Professional driers: 24

Similar models have not been counted if from the same brand.

There are 52 tumble drier models of 16 different brands on the Topten.eu product list: AEG, Bauknecht, BEKO, Blomberg, Bosch, Electrolux, Fagor, Ferrum AG, Hepro, Gorenje, Grundig, Miele, Primus (Fors AG), Schulthess, Siemens and V-ZUG.

The number of A+++ models has increased significantly in the last years. The number of professional driers using heat pump technology is rapidly increasing.

## 2. Expected selection criteria in 2019

Topten.eu selection criteria expected for 2019:

Resident driers already require the highest Energy efficiency and condensation efficiency class possible. For Semi-professional driers a tightening to energy class A+++ is possible if the models continue to advance.

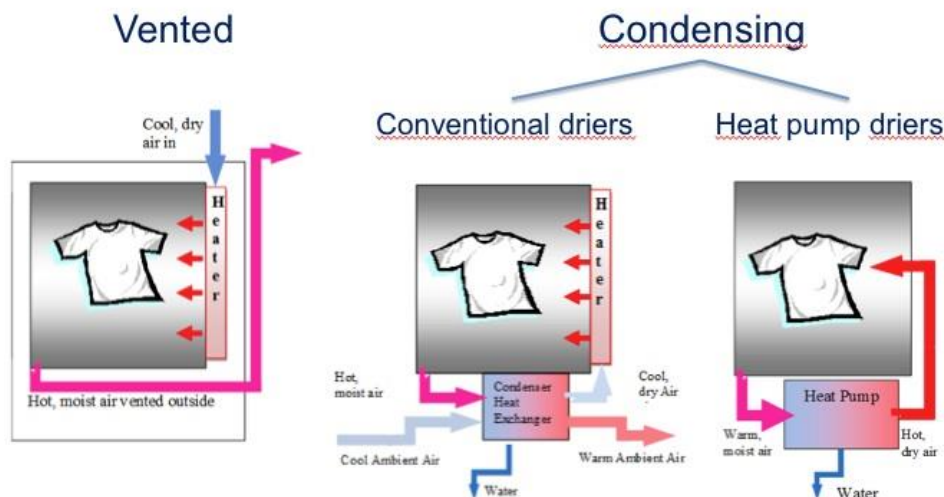
## 3. Technical background

Tumble driers evaporate the moisture by blowing hot dry air through wet laundry. The air is typically heated by an electric resistance heating element. European driers use one of two different technologies to remove the evaporated water:

- Vented driers (open systems) blow the moist exhaust air (drawn from the building interior) outdoors, which can cause unwanted smells, steam and noise at the external vent.
- Condensing driers (closed systems) use a heat exchanger cooled by interior air to condense water from the warm moist air in the drier.

Heat pump driers are usually condensing driers which also integrate a heat pump. Warm, damp air flows out of the laundry drum into the evaporator, where the air is dehumidified, and the warm air returned to the drum.

Heat pump driers consume only about half of the electricity of conventional condensing driers. This makes them a highly efficient alternative to conventional systems. However, within the group of heat pump driers the energy efficiency varies quite considerably. Due to lower operating temperatures heat pump driers also cause less damage to clothing than other types of driers but increase drying times. (source: Bush, 2015)



Source: Super Efficient Dryer Initiative SEDI

Figure 1: Tumbler technologies

A good condensation efficiency is also important, because if too much humidity is expelled into the room instead of condensed and collected, building damages can be caused. In order to avoid these, an air dehumidifier might be needed – leading to additional electricity consumption.

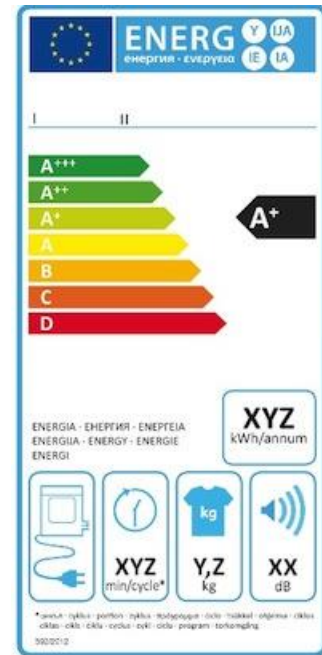
## 4. Policy measures, standards and labels

The Ecodesign requirements and Energy Label from 2012, currently in force, are expected to lead to 9.5 TWh of savings in 2030. The revision for tumble driers has started in 2017 and a first stakeholder meeting took place in June 2018.

## Energy Label

The current energy Label for tumble driers (regulation No. 392/2012) with classes up to A+++ applies since June 2013. Classes A and better are to date only reached by tumble driers with integrated heat pump. Nearly all of them are even in classes A+ to A+++ - only few, relatively inefficient heat pump driers are in class A.

The classification scale is based on the Energy Efficiency Index (EEI). The EEI is the relation of a model's annual energy consumption to a reference model's (of the same capacity) energy consumption (in %). The EEI calculation formula assumes 160 drying cycles per year (around three per week), of which 4 out of seven are assumed to be operated with a half load filling. Left-On and Off mode power consumption is also included. For vented driers, the standard energy consumption (the reference) is reduced by a factor depending on cycle time. For gas driers, a primary energy conversion factor of 2.5 is included in the formula.



Energy Label		Ecodesign requirements
Class	EEI	
A+++	EEI < 24	
A++	32	
A+	42	
A	65	
B	76	
C	85	Banned from Nov 2015
D	85 ≤ EEI	Banned since Nov 2013

Table 1: Energy Label classes according to the EEI

The condensation efficiency indicates the percentage of humidity that is condensed and collected. The rest (10% for class A) is expelled to the room.

Condensation efficiency class	Weighted condensation efficiency	Ecodesign requirements
A	C > 90	Banned from Nov 2015 Banned since Nov 2013
B	80	
C	70	
D	60	
E	50	
F	40	
G	C < 40	

Table 2: Condensation efficiency classes

Apart from energy and condensation efficiency, the Label also indicates the annual energy consumption (assuming 160 drying cycles per year), cycle time of the full load cotton programme, capacity (kg), sound power level (dB) and whether the model is an electric or gas drier.

In the Label Fiche, manufacturers must additionally declare the power consumption of the left-on and off mode, the duration of the left-on mode, and for the standard cotton programme at full and half load: the energy consumption per cycle, the programme time, and the condensation efficiency.

### Ecodesign requirements

Tier 1 of the Ecodesign regulation for tumble driers No 932/2012 applies since 1<sup>st</sup> November 2013: tumble driers must reach at least energy efficiency class C and condensation efficiency class D. This means that the worst performing driers are banned from the market. In November 2015 the requirements will be made more ambitious, and drier models must reach the energy efficiency class B and condensation efficiency class C (see table 3).

Ecodesign requirements for driers		Minimum energy efficiency		Min. condensation efficiency
		New EEI	Class	
Tier 1	Nov. 2013	< 85	C	60%
Tier 2	Nov. 2015	< 76	B	70%

Table 3: Minimum performance requirements according to regulation No 932/2012

In the last few years vented driers have been improved, so that they can meet class B and are not banned by tier 2.

### 4.1. Market analysis

The Topten market monitoring report from June 2016 showed that tumble drier sales reached a first peak of 4 million units in 2006, then dropped to around 3.5 million units until 2013. In 2015 a new maximum of 4.2 million tumble driers were sold across the EU-21 (around 0.8 units per 100 inhabitants and year). Heat pump tumble driers accounted for 47% of total sales.

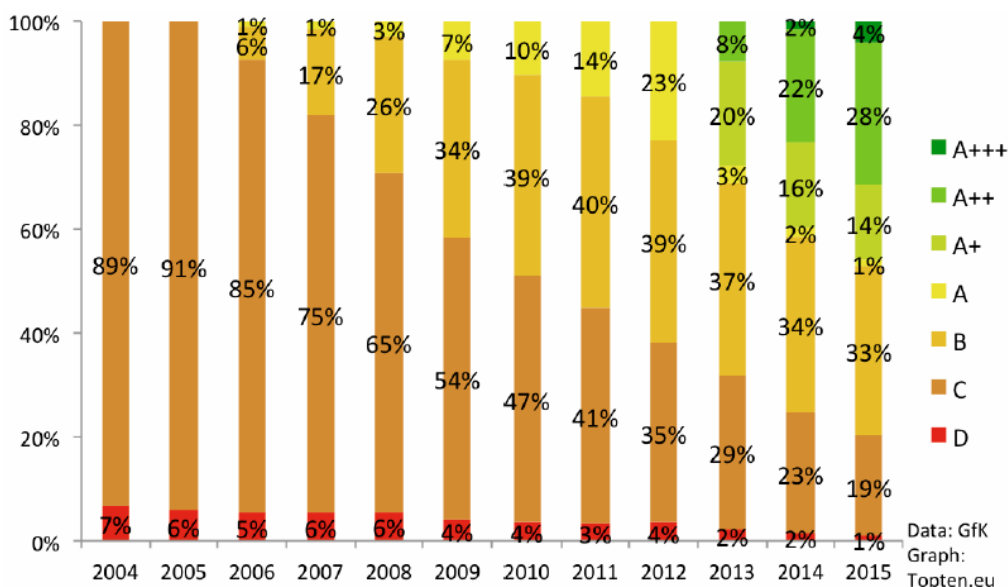


Figure 2: Sales of tumble driers according to their energy efficiency classes in the EU from 2004 to 2015

In Switzerland, only heat pump driers are allowed on the market since 2012. Since 2015, driers must meet A+ efficiency in Switzerland.

More results from the EU, France, Germany and Switzerland are available in the report: <http://www.topten.eu/uploads/File/Market-Monitoring-2016-EN-Topten.eu.pdf>

### 5. FAQ: common questions from manufacturers and consumers

What is the most energy efficient method to dry the laundry?



The most efficient way to dry the laundry is to hang it outside and have it dried by sun and wind. If space and weather allow, this is clearly the option to choose.

*Do programmes of heat pump driers last longer?*

No, not in general. There are many heat pump driers with pretty short standard programme times, and they can be faster than many conventional driers. On Topten.eu there are 15 models with programme times shorter than 150 minutes. The fastest model with heat pump driers the laundry in the standard programme in 91 minutes.

## 6. References and links

### Useful links

Topten.eu tumble driers product lists:

<http://www.topten.eu/english/household/dryers/residential-use-7kg.html>

<http://www.topten.eu/english/household/dryers/residential-use-8kg.html>

<http://www.topten.eu/english/household/dryers/residential-use-9kg.html>

[http://www.topten.eu/english/household/dryers/more\\_families.html](http://www.topten.eu/english/household/dryers/more_families.html)

<http://www.topten.eu/english/household/dryers/professional-use.html>

Topten.eu tumble driers selection criteria:

[http://www.topten.eu/english/criteria/tumble\\_dryers.html&fromid=](http://www.topten.eu/english/criteria/tumble_dryers.html&fromid=)

Topten policy recommendations (from January 2014):

[http://www.topten.eu/uploads/File/Recommendations\\_driers\\_Jan\\_2014.pdf](http://www.topten.eu/uploads/File/Recommendations_driers_Jan_2014.pdf)

### References

Energy Label for driers, regulation No. 392/2012, and corrigendum:

<http://www.topten.eu/uploads/File/Energy%20Label%20Driers%20March%202012.pdf>

<http://www.topten.eu/uploads/File/Corrigendum%20Energy%20Label%20Driers%20May%202012.pdf>

Ecodesign regulation No. 932/2012 for tumble driers:

[http://www.topten.eu/uploads/File/Ecodesign\\_regu\\_932\\_2012\\_driers.pdf](http://www.topten.eu/uploads/File/Ecodesign_regu_932_2012_driers.pdf)

Eric Bush et al.: Heat pump tumble driers: market development in Europe and MEPS in Switzerland. Presented at EEDAL in Lucerne, August 2015.

[http://www.topten.eu/uploads/File/EEDAL15\\_Eric\\_Bush\\_Heat\\_Pump\\_Tumble\\_Driers.pdf](http://www.topten.eu/uploads/File/EEDAL15_Eric_Bush_Heat_Pump_Tumble_Driers.pdf)

Topten: Energy efficiency of white goods in Europe: monitoring the market with sales data.

June 2015. [http://www.topten.eu/uploads/File/WhiteGoods\\_in\\_Europe\\_June15.pdf](http://www.topten.eu/uploads/File/WhiteGoods_in_Europe_June15.pdf)

European Commission. Review Study on Tumble driers, draft interim report. March 2018.