ANTICSS Project Deliverable D18 (D4.5):

Test Reports – Part 7: Household tumble driers

– final version –

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1 About the ANTICSS project

Objective of the research project 'Anti-Circumvention of Standards for better market Surveillance (ANTICSS)' is to assess and clearly define 'circumvention' in relation to EU Ecodesign and Energy labelling legislation and relevant harmonised standards.

The analysis of circumvention will be based on collecting and learning from cases of circumvention by literature research and dedicated expert interviews, as well as analysing existing EU Ecodesign and Energy labelling legislation and standardisation for possible loopholes. Also the potential relation between circumvention and so called 'smart' products with specific embedded software will be addressed by the project. Alternative test procedures to better detect circumvention by testing shall be developed and through testing a certain number of appliances within the ANTICSS project, the impacts 'if' and 'how much' energy consumption and/or functional performance modifications could be ascribed to circumvention will be assessed.

Based on the results, ANTICSS will provide practical capacity building measures for key actors of market surveillance and test laboratories, support communication and collaboration platforms between major stakeholders and provide policy recommendations for policy makers and standardisation bodies to prevent future circumvention under EU Ecodesign and Energy labelling. ANTICSS project is also designed to provide reliability to manufacturers by specifying potentially vague legislation and standards which might be interpreted differently by market actors and some of them taking unfair advantages so far. By overall awareness raising on circumvention among stakeholders, ANTICSS is supporting an effective EU legislation enforcement and thus increasing acceptance and trust of market actors and civil society into the Ecodesign and Energy labelling legislation.

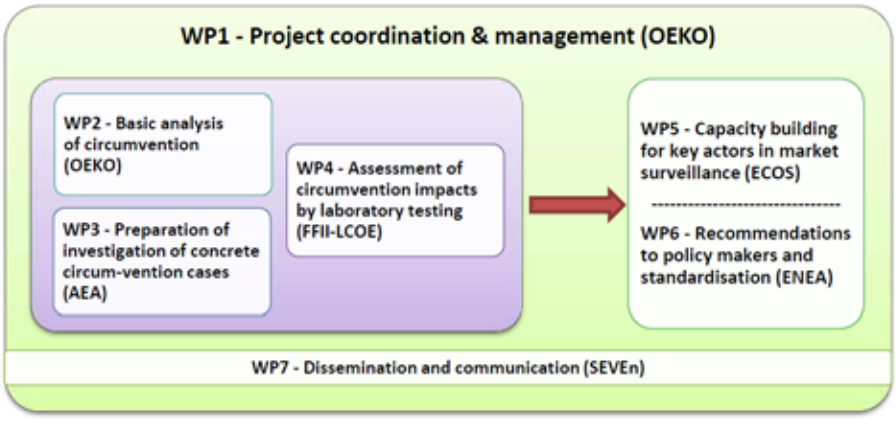

Figure 1-1: ANTICSS Work Packages

2 ANTICSS definition of circumvention and jeopardy effects

For better understanding, first the underlying ANTICSS definitions of 'circumvention' and 'jeopardy effects' in relation to EU Ecodesign and Energy labelling legislation and related harmonised standards are presented. These definitions build the basis for the research within the ANTICSS project, namely the categorisation of collected suspect behaviour cases and the assessment of circumvention impacts in laboratory testing[1].

DEFINITION OF 'CIRCUMVENTION'

„Circumvention is the act of designing a product or prescribing test instructions, leading to an alteration of the behaviour or the properties of the product, specifically in the test situation, in order to reach more favourable results for any of the parameters specified in the relevant delegated or implemented act, or included in any of the documentations provided for the product."

The act of circumvention is relevant only under test conditions and can be executed e.g.
a) by automatic detection of the test situation and alteration of the product performance and/or resource consumption during test, or
b) by pre-set or manual alteration of the product, affecting performance and/or resource consumption during test or
c) by pre-set alteration of the performance within a short period after putting the product into service.

DEFINITION OF 'JEOPARDY EFFECTS'

"Jeopardy effects encompass all aspects of products or test instructions, or interpretation of test results, which do not follow the goal of the EU ecodesign and/or energy labelling legislation of setting ecodesign requirements and providing reliable information about the resource consumption and/or performance of a product. These effects may not be classified as circumvention, but become possible due to loopholes or other weaknesses in standards or regulations."

[1] Further details and examples can be found in the ANTICSS Deliverable D8 "Definition of 'circumvention' and 'jeopardy effects' in relation to EU Ecodesign and Energy labelling legislation", see https://www.anti-circumvention.eu/storage/app/media/uploaded-files/D08_ANTICSS_Final-definitions_circumvention.pdf

3 Goal and general approach of this work package

Selection of product categories and cases for testing within ANTICSS

Objective of the current ANTICSS work package WP4 ("Assessment of circumvention impacts in laboratory testing") is to test product categories and cases initially categorised as circumvention or jeopardy effects according to the previous tasks of the project, see Table 3-1.

Table 3-1: Overview of cases tested in ANTICSS

Deliverable D18	Lot	Product category	Case
Part 1	ENER 1	Space heaters	Heaters 2 – Variable speed compressor
Part 2	ENER 5	Televisions	TV 1 – Setting of brightness TV 2/3 – Test loop recognition
Part 3	ENER 10	Room air conditioning	RAC 2 – 1) Defrost 2) Variable speed compressor
Part 4	ENER 13	Domestic freezers and refrigerators-freezers	COLD 2/4 – Multiple operation modes / holiday mode COLD 3 – Display is continuously activated
Part 5	ENER 14	Domestic dishwashers	DISH 1 – Separate bowl support DISH 2 – Specific pre-treatment before testing DISH 3 – Removal / alteration of accessories DISH 4 – Dishwasher with water tank
Part 6	ENER 14	Domestic washing machines	WASH 1.2 – Loading capacity WASH 3 – Hidden software
Part 7	ENER 16	Household tumble driers	DRIER 1 – Special preparation before testing DRIER 2 – Hidden Software
Part 8	ENER 22	Domestic ovens	OVEN 1 – Volume without shelf guides OVEN 2 – Maximum temperature in centre of oven OVEN 3 – Electronic control

Specific model selection procedure for testing appliances within ANTICSS

For each product category to be tested, three different appliance models were selected and one unit of each model was purchased.

Disclaimer 1: The model selection procedure (see Deliverable D15: *Model selection procedure for alternative testing*[2]) was specifically targeted at finding appliances with a high probability of a circumvention behaviour. Therefore the results of the tests within the ANTICSS project do not provide, and must not be considered as providing, a representative overview of the tested product categories on the market.

[2] https://www.anti-circumvention.eu/storage/app/media/D15_ANTICSS_Model-selection_final.pdf

This selection procedure is preparatory to the achievement of the ANTICSS project objective that is learning how to improve current harmonised standards and Regulations in order to better detect and prevent circumvention in future.

Development and use of alternative test procedures within ANTICSS

For each of the cases, each model was tested according to the harmonized standard to measure the parameters of the Ecodesign and Energy label regulations of interest for the project.

Within ANTICSS, in addition, alternative test procedures have been developed (see Deliverable D14: *Alternative test methods and approaches to unmask circumvention under EU Ecodesign and Energy labelling*[3]) for the following goals:

- Analyse whether the suspected circumvention behaviour can be confirmed in laboratory tests through the application of the alternative test method, and
- Assess the magnitude of the impact of the circumvention in terms of effects on energy consumption and functional performance.

Disclaimer 2: The values declared for the compliance with the ecodesign and energy labelling requirements are measured with harmonised standards published in the EU Official Journal for the related Regulations. The use of other measurement methods – as for the ANTICSS alternative test methods – may lead to different results and cannot be used for compliance verification. Also, it was not proven in the project (and was not the task to do so) that the alternative test method does deliver results with the same repeatability and reproducibility as the test methodology of the harmonised standards.
Nevertheless, according to the ANTICSS project's experts the specifically chosen and well documented deviations of the ANTICSS test methods from the harmonized standards do not generally result into substantial deviations of the results from those obtained when tested according to the harmonised standard test conditions. Therefore the ANTICSS project considers that the harmonised standard and the alternative test method as well as the achieved test results, although not usable for compliance verification, are in principle broadly comparable for the purposes of the project.

Interpretation of results based on the ANTICSS alternative testing procedures

The measurement results of the alternative test procedure are compared to the declared values as well as to the measurement results of the tests conducted using the harmonized standard.

The verification tolerances for market surveillance purposes related to the tested parameters as provided in the Ecodesign and Energy label regulations of the respective product category are used

[3] https://www.anti-circumvention.eu/storage/app/media/D14_ANTICSS_Alternative-test-procedures_final.pdf

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as a reference for determining the importance of the deviation between the results achieved under the "standard" and the "alternative" test conditions.

In general, if the deviation between the values obtained with the standard and the alternative test method exceeds the verification tolerance, the specific result of the alternative test is considered as being "different" from that of the harmonised standard and a possible indication for circumvention.

Disclaimer 3: The scope of the ANTICSS project is to define, detect the presence, and find ways to avoid in future 'circumvention' and jeopardy effects. The project is not meant to verify the compliance of the models selected for laboratory testing. In this respect in this report we have on purpose avoided to use expressions like "compliance verification" or "model compliance". When the results of laboratory testing conducted using a *harmonised standard* deviate more than the established verification tolerance from the declared values for the involved parameters the model is indicated as "non-conforming", in a contrary case the model is indicated as "conforming". Only the Market Surveillance Authorities partners of ANTICSS, to whom the test results are forwarded, will be in charge of any decision about launching, outside the project development, an action to verify the compliance of the models.

For models that turned out being non-conforming with the requirements of the Ecodesign and Energy label regulations according to the test results of the harmonized standard procedure, still the ANTICSS alternative test procedures were applied and test results of the harmonized and the alternative test procedure were analysed in terms of relevant deviations. The main purpose of the testing in ANTICSS is in fact the detection of possible circumvention, and this effect can well happen independently from the model compliance to the EU legislation requirements.

ANTICSS categorization of models and cases

The interpretation of the test results by the ANTICSS project team is based on the ANTICSS definitions of circumvention and jeopardy effects given in section 2. Different interpretations of the results within the project team are presented transparently. Further, the test results were also presented to the members of the ANTICSS Advisory Board[4] and their views were taken into account as well.

The following figure presents the underlying understanding for the categorisation of cases and tested models within ANTICSS.

[4] See https://www.anti-circumvention.eu/contacts/advisory-board

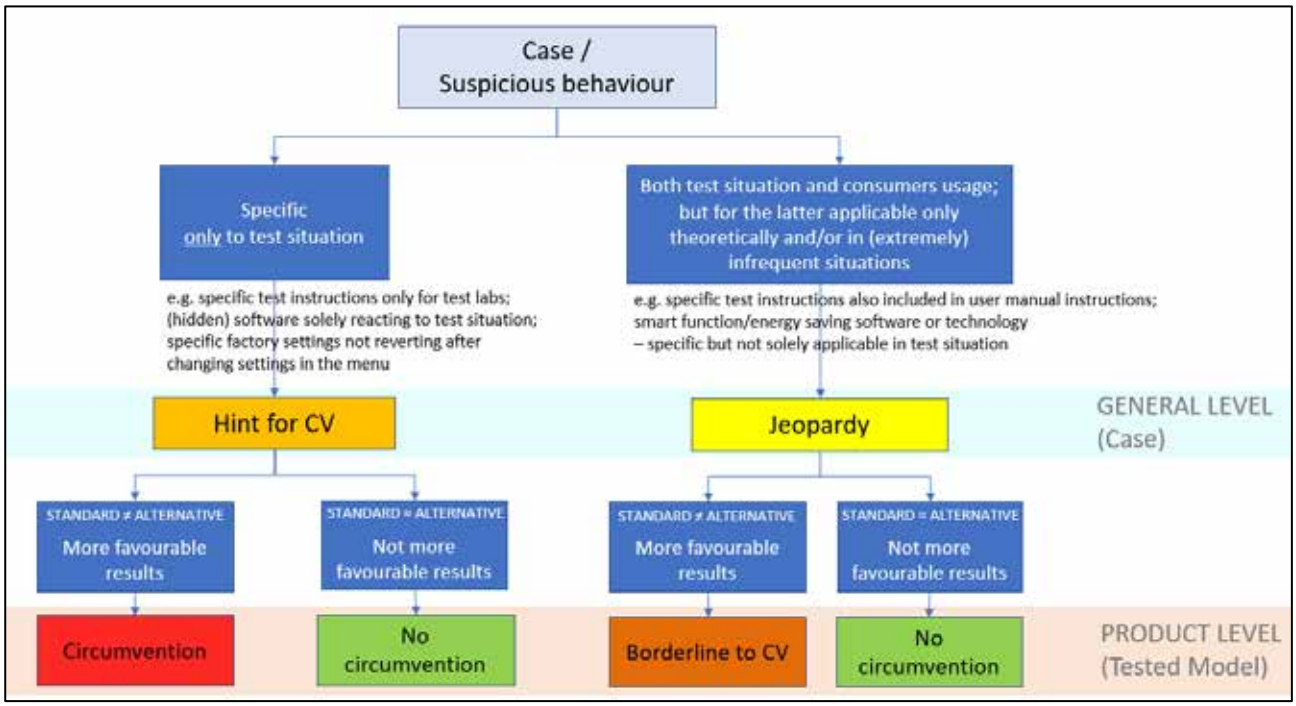

Figure 3-1: ANTICSS categorisation of cases and tested models to circumvention and jeopardy effects

ANTICSS differentiates between the general level ("Case") detected or reported, and the product level, i.e. the test results for the models tested within ANTICSS. Although the act of circumvention might not be found in the tested model (green), it might be considered still applicable to other models of the product category not tested in ANTICSS, i.e. the general case is still classified either as "jeopardy effect" (yellow) or "hints for circumvention" (orange).

- Cases specific *only* to the test situation are providing "hints for circumvention": i.e. cases indicating e.g. specific test instructions only for test labs, or (hidden) software solely reacting to the test situation, or specific factory settings not reverting after changing the settings in the menu. If the alternative test result of the tested model leads to relevant deviations of the standard test result, i.e. exceeding the verification tolerances for market surveillance purposes, the model is categorized as "circumvention".
- Cases that apply in both the test situation and consumers usage, but for the latter applicable only theoretically or in (extremely) infrequent situations are called "Jeopardy effects": e.g. specific test instructions which are also included in the user manual instructions, or smart functions / energy or resource saving software or technologies, being specific but not solely applicable in the test situation. If the alternative test result of the tested model leads to relevant deviations of the standard test result, i.e. exceeding the verification tolerances for market surveillance purposes, the model is categorized as "borderline to circumvention".

According to the current ANTICSS definition of circumvention, these acts are not relevant only under test conditions, but still, the design of the product or the test instructions are utilized in a way to reach more favourable results specifically in the test situation.

Categorization as circumvention – depending on the illegality of the act?

Currently, most of the cases categorized as circumvention according to the definition of ANTICSS are "formally" not illegal. So far, a paragraph on circumvention not being allowed is only included in few Ecodesign regulations of the so called "winter package"[5]. Circumvention as included in these regulations, however, only cover products recognizing the test condition and reacting specifically by automatically altering their performance during the test, i.e. point a) of the ANTICSS definition of circumvention. This means that "formally", all cases falling under point b) and c) of the ANTICSS definitions of circumvention, as well as cases of point a) but applied in product categories not including the paragraph on circumvention in the Ecodesign regulation, are so far not illegal.

This is especially discussed for those cases where manufacturer's instructions shall be explicitly followed according to the harmonized standard and/or the legislation with the objective to deliver in tests accurate results in terms of *repeatability* (to get the same value again when measuring some time later) and *reproducibility* (to get the same or similar results measured in another laboratory). In ANTICSS, the general allowance of manufacturer's instructions is pointed out as potential weakness or loophole of the standard as it provides also the possibility for exploitation to achieve more favourable results specifically in the test. Again, this is "formally" not illegal. However, these acts correspond with the definitions of ANTICSS and thus are categorized as "circumvention" or "borderline to circumvention" if the exploitation becomes apparent.

Aim of the ANTICSS project is not judging the legality or illegality of the cases and tested models, but to provide the scientific basis (definitions, test results, potential impacts) for political decision makers to decide if the results are relevant to take them into account in the future development and revision of legislation and standards.

5 Ecodesign regulations (EU) 2019/1781 (electric motors and variable speed drives); (EU) 2019/1783 (small, medium and large power transformers); (EU) 2019/1784 (welding equipment); (EU) 2019/2019 (refrigerating appliances); (EU) 2019/2020 (light sources and separate control gears); (EU) 2019/2021 (electronic displays); (EU) 2019/2022 (household dishwashers); (EU) 2019/2023 (household washing machines and household washer-dryers); (EU) 2019/2024 (refrigerating appliances with a direct sales function); (EU) 2019/424 (servers and data storage products)

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Conclusions and further proceedings based on the results of the ANTICSS alternative testing

Specific models that turned out being non-conforming with requirements of the Ecodesign and Energy label regulations according to the test results of the harmonized standard are reported to the Market Surveillance Authorities partners in the ANTICSS project for further follow up outside the development of the project.

The general results will be further fed into the next ANTICSS work packages as follows:

- Analysis on how the specific circumvention behaviour can be detected through laboratory testing, as basis for capacity building of MSAs in work package WP5 ("Capacity building for key actors in market surveillance");
- Development of strategies and guidelines on how preventing the specific types of circumvention through the revision/improvement of the EU legislation and the relevant harmonised standards in work package WP6 ("Conclusions from circumvention investigation and policy recommendations");
- Preparation of results and reports to be used for communication to stakeholders and the public in work package WP7 ("Dissemination and communications").

In the following sections, the results of testing the respective product category, cases and models within the ANTICSS project are described in detail.

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4 Household tumble driers

The following table shows an overview of which of the three product models was tested for which of the cases initially categorized as hints for circumvention or jeopardy effect in work package WP3.

Table 4-1: Overview of cases and models tested in the product category tumble driers

	Model A	Model B	Model C
Case DRIER1	Tested	-----	---
Case DRIER2	Tested	Tested	Tested

4.1 Case DRIER1

4.1.1 Description of the case

Some tumble dryers have a statement in the instructions regarding special preparation before commencing tests according to the harmonised standard EN 61121. It is possible that this specific set of requirements could trigger a different performance profile compared to the "normal profile".

4.1.2 Standard and alternative testing procedure

STANDARD TESTING PROCEDURE:

The chapter 6 of the standard EN 61121:2013 states that the tumble drier is installed and used in accordance with the manufacturer's instructions. In clause 8.4.2 it is said that "the tumble drier shall be conditioned no more than 36 hours before the first test run by drying a rated capacity load that has been wetted to no less than the minimum relevant value given in table 5".

Prior to the alternative testing procedure, the tests were conducted according to the harmonised standard EN 61121:2013 with the special preparation according to the manufacturer's instructions and the tumble drier was conditioned according to clause 8.4.2.

All the parameters required in the EL/ED regulations were measured (i.e. EEI, moisture content, energy consumption, programme time etc.).

ALTERNATIVE TESTING PROCEDURE:

The alternative testing method consisted on performing the tests according to EN61121:2013 without applying the special preparation required by the manufacturer but including the conditioning of the tumble drier described in clause 8.4.2 of the standard. All the parameters required in the EU Regulations and measured in the harmonised standard were measured (i.e. EEI, moisture content, energy consumption, programme time etc.) and compared with the

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corresponding tests performed with the special preparation according to the manufacturer's instructions.

The purpose of this analysis is to check how the special preparation mandated by the manufacturer affects the energy and functional performance of the tumble drier.

4.1.3 Summary of results

The manufacturer instructions of Model A contained the following indications:

Indicación para pruebas comparativas:
En las comprobaciones según EN 61121, antes de comenzar las pruebas, deberá llevarse a cabo en el programa *Algodón, con secado normal* un programa de secado con 3 kg de ropa de algodón según indica la norma anteriormente mencionada con un 70 % de humedad residual inicial.

Indicación para institutos de investigación	– El programa *Algodón* ⟨⟩ es el programa de comprobación según el reglamento 392/2012/EU para etiqueta energética de acuerdo a EN 61121. – Al seleccionar el ajuste de programa *Algodón* y *Algodón* ⟨⟩ se evacua al exterior el agua condensada a través de la manguera de desagüe.

Indications for testing labs for tests according to EN 61121:

- Before the tests, a cycle with a load of 3 kg and 70% of initial moisture content in the cotton normal-dry programme has to be performed
- When selecting the program Cotton, the condensed water will be drained off through the drain hose (not using the condensed water container)

All these instructions were taken into account when performing the tests according to the harmonised standard. In this case the test of the alternative procedure was performed before the standard test to avoid that the special preparation required by the manufacturer could interfere with the results of the alternative test.

The results obtained for the different parameters are detailed below:

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4.1.3.1 Energy consumption

Table 4-2: Case DRIER1. Model A. Energy consumption, energy efficiency class and EEI

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat.vs declared	Alternat. vs standard
Treatment half (kWh)	0,78	0,79	0,78	0,00%	1,28%	1,28%
Treatment full (kWh)	1,44	1,45	1,41	2,13%	2,84%	0,69%
Average (kWh)	1,06	1,08				1,89%
Annual energy consumption	171,93	173,63	171	0,54%	1,54%	0,99%
EEI	23,3	23,5				
Energy efficiency class	A+++	A+++	A+++			

The results of the alternative procedure are only slightly (0,69% to 1,89%) higher than the ones of the standard procedure.

4.1.3.2 Programme time

Table 4-3: Case DRIER1. Model A. Programme time

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (min)	93	94	106	-12,26%	-11,32%	1,08%
Treatment full (min)	157	159	177	-11,30%	-10,17%	1,27%
Average (min)	120	122	136	-11,76%	-10,29%	1,67%

The results of the alternative procedure are only slightly (1,08% to 1,67%) higher than the ones of the standard procedure. The values obtained in both tests performed by ANTICSS project, standard and alternative procedures, are much lower (on average -11,76% and -10,29%) than the values declared by the manufacturer. This fact is especially striking because it does not happen in the same way as for the energy consumption where the declared values and those obtained during the ANTICSS test are close. It seems logical to think that if the energy consumption is similar, the duration of the programme should be similar as well.

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4.1.3.3 Condensation efficiency

Table 4-4: Case DRIER1. Model A. Condensation efficiency

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (%)	96,6	94,4	94	2,77%	0,43%	-2,28%
Treatment full (%)	93,6	94,2	93	0,65%	1,29%	0,64%
Average (%)	95,3	94,3	94	1,38%	0,32%	-1,05%
Condensation efficiency class	A	A	A			

The results of the alternative procedure are only slightly different (on average -1,05%) from the ones of the standard procedure.

4.1.4 Conclusions about this case

According to the flow chart (see section 3, Figure 3-1), this case at the general level, i.e. specific test instruction only for test labs, initially provided "hints for circumvention" according the definition included in chapter 2 of this report, in particular corresponding to section b) of the definition:

"Circumvention is the act of designing a product or prescribing test instructions, leading to an alteration of the behaviour or the properties of the product, specifically in the test situation, in order to reach more favourable results for any of the parameters specified in the relevant delegated or implemented act,or included in any of the documentations provided for the product. The act of circumvention is relevant only under test conditions and can be executed
b) by pre-set or manual alteration of the product, affecting performance and/or resource consumption during test."

According to regulations 932/2012 and 392/2012 the verification tolerance for market surveillance purposes concerning energy consumption, programme time and condensation efficiency is 6%. If this 6% are used as a reference for determining the importance of the deviation between the standard and the alternative procedure, the conclusion is that the differences between the values obtained in the standard and the alternative procedure for Model A are not relevant. The values obtained in the tests according to the alternative procedure would conform with the requirements of the EL/ED regulations. The manufacturer does not reach more favourable results for any of the parameters under testing. So, the initial hint for circumvention has not been confirmed for this specific tested model.

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However, although circumvention has not been confirmed for this specific tested model, the inclusion of indications solely for testing labs in the user manual resulting in a better positioning in the laboratory testing could still be used in other tumble drier models on the market for "circumventing".

Only few of the tumble driers in the market include such kind of specific indications for testing labs in their booklet of instructions. If the results of following or not these indications are similar, the indications are not useful for a more efficient use of the appliance neither by the user nor for a better positioning of the appliance in a laboratory testing. But as they can still be an open door for circumvention, we consider that it is not justified to allow including such indications only for testing labs in the manufacturer's instructions unless the manufacturer provides a technical explanation about the underlying technical justification and also for the reason why the same indication is not applicable also in the real life use of the drier by consumers.

The alternative testing method is generally considered suitable for disclosing the suspicious behaviour in cases similar to this one.

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4.2 Case DRIER2

4.2.1 Description of the case

White goods may theoretically comprise hidden software/sensors that detect the specific ambient testing conditions of the standard and run specific algorithms that result in lower resource consumption (energy, water, etc.).

4.2.2 Alternative testing procedure

STANDARD TESTING PROCEDURE: Prior to the alternative testing procedure, the tests according to the harmonised standard EN 61121:2013 were conducted with the rated capacity. According to this standard, a test series of 7 tests has to be carried out with 2 different treatments as follows:

- Treatment full: 3 test runs
- Treatment half: 4 test runs

The tests have to be performed with a stable supply voltage of 230V ±1%. All the parameters required in the EL/ED regulations were measured (i.e. EEI, moisture content, energy consumption, programme time etc.).

ALTERNATIVE TESTING PROCEDURE: Then, the supply voltage to each tested tumble drier was maintained throughout the test at 230V +6% = 243,8V with a stability of ±2%. A test series of 4 tests is carried out on the tumble dryer with 2 different treatments as follows:

- Treatment full: 2 test runs
- Treatment half: 2 test runs

The values of the different parameters for each treatment are calculated as the average of the values of these parameters obtained in all test runs performed according every treatment. Normally, within the same treatment, the results of the different test runs are very similar, so, in order to simplify the alternative testing procedure, the number of test runs for every treatment has been reduced. All the parameters required in the EU Regulations and measured in the harmonised standard were measured (i.e. EEI, moisture content, energy consumption, programme time etc.) and were compared with the corresponding standard tests performed with a stable supply voltage (230V ±1%). The purposes of this analysis are to:

- analyse if the rather stricter ambient conditions (stable voltage supply) in the harmonised standard might trigger the activation of any possible hidden software/sensors that can cause lower resource consumption (energy, water, etc.);
- see how the variation of the supply voltage of the alternative testing, more likely to happen in real life conditions, can influence the energy and functional performance of the tumble drier.

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Modifications, improvements or clarifications to the initial alternative testing procedure

The supply voltage to each tested tumble drier was maintained throughout the alternative test at 230V +6% = 243,8V with a stability of ±2%. This supply voltage is very different from the stabilized supply voltage in the harmonised standard 230V ±1%, so we can check if the appliance behaves in a different way without the conditions of the standard.

4.2.3 Summary of results

4.2.3.1 Model A

The results obtained for the different parameters are detailed below:

4.2.3.1.1 Energy consumption

Table 4-5: Case DRIER2. Model A. Energy consumption, energy efficiency class and EEI

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (kWh)	0,78	0,78	0,78	0,00%	0,00%	0,00%
Treatment full (kWh)	1,44	1,47	1,41	2,13%	4,26%	2,08%
Average (kWh)	1,06	1,08				1,89%
Annual energy consumption	171,93	173,76	171	0,54%	1,61%	1,06%
EEI	23,3	23,5				
Energy efficiency class	A+++	A+++	A+++			

The results of the alternative procedure for the energy consumption are the same or only slightly higher (0% to 2,08%) than the ones of the standard procedure, maximum deviating from the declared values by 4.26% in the full treatment repeated only 2 times.

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4.2.3.1.2 Programme time

Table 4-6: Case DRIER2. Model A. Programme time

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (min)	93	91	106	-12,26%	-14,15%	-2,15%
Treatment full (min)	157	155	177	-11,30%	-12,43%	-1,27%
Average (min)	120	119	136	-11,76%	-12,50%	-0,83%

For the programme time, the results of the alternative procedure are only slightly lower (on average -0,83%) than the ones of the standard procedure. However, the values for the programme time obtained in both tests performed by ANTICSS project, standard and alternative procedures, are much lower than the values declared by the manufacturer (on average -11,76% in the standard and -12,5% in the alternative testing). This fact is especially striking because it does not happen in the same way as for the energy consumption where the declared values and those obtained during the ANTICSS test are rather similar.

4.2.3.1.3 Condensation efficiency

Table 4-7: Case DRIER2. Model A. Condensation efficiency and class

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (%)	96,6	87,3	94	2,77%	-7,13%	-9,63%
Treatment full (%)	93,6	96,8	93	0,65%	4,09%	3,42%
Average (%)	95,3	91,4	94	1,38%	-2,77%	-4,09%
Condensation efficiency class	A	A	A			

This parameter has been highly affected by the alternative procedure with half treatment deviating by -9,63%. However, the table only shows the average of the values of each treatment (full and half load) and the total average that is the weighted average of both treatments.

During the tests according to the alternative testing procedure, the values of the condensation efficiency of every cycle were very different among them. This situation is not reflected in the table with the results because in the average value some individual results are compensated by others.

In the following graph, the condensation efficiency values of each cycle are shown:

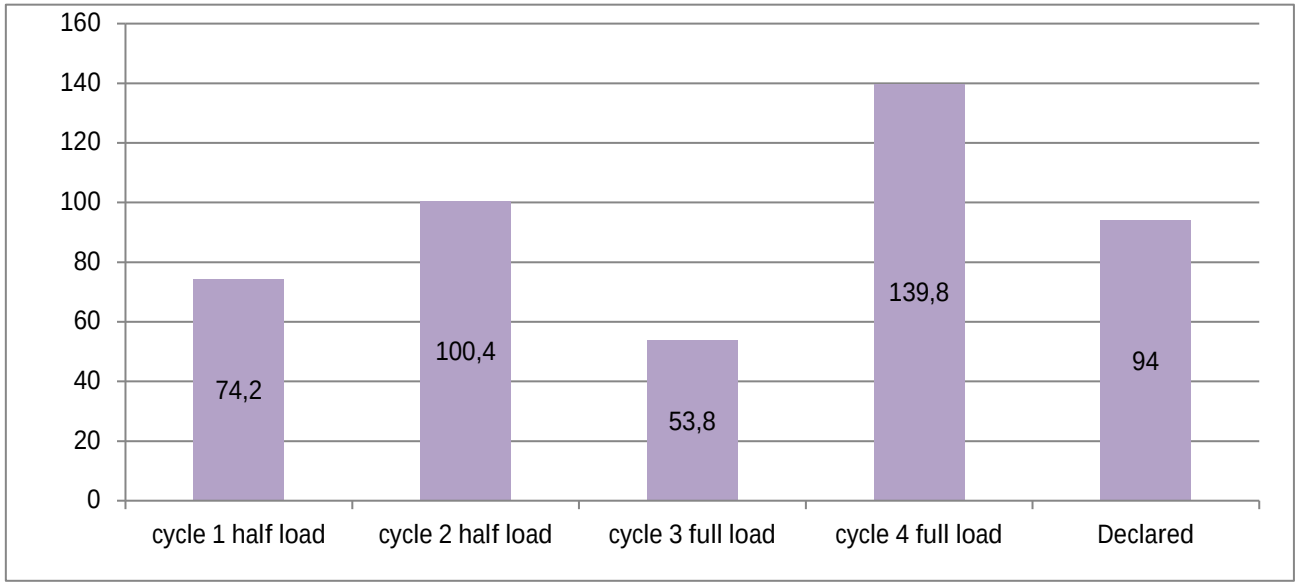

Figure 4-1: Case DRIER2. Model A. Condensation efficiency of each cycle

4.2.3.2 Model B

During the test according to the harmonised standard, when testing the first cycle with full load, the dryer stopped because the condensate container was full of water. According to the standard, this test run is considered invalid. The test run was repeated, however, with the same result. Then, the test run was repeated again and the condensed water was drained off through the drain hose. In this case, the final moisture content was lower than the value required by the standard.

It was not possible to perform the test according to the harmonised standard.

The same situation happened when testing the cycles with full load with the alternative testing procedure. Therefore, the behaviour of the drier when testing the full load cycles was not considered valid according to the harmonised standard. This model does not comply with the requirements of the harmonised standard and does not conform with the ED/EL regulations.

In the following tables, the values corresponding to the full treatment and the average are shown only for comparative purposes[6]. They are indicated in red.

4.2.3.2.1 Energy

Table 4-8: Case DRIER2. Model B. Energy consumption, energy efficiency class and EEI

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (kWh)	0,91	0,89	0,86	5,81%	3,49%	-2,20%
Treatment full (kWh)	2,12	1,94	1,66	27,71%	16,87%	-8,49%
Average (kWh)	1,43	1,34				-6,29%
Annual energy consumption	230,05	215,45	194	18,58%	11,06%	-6,35%
EEI	28,3	26,5				
Energy efficiency class	A++	A++	A+++			

The results of the alternative procedure are lower (especially for the full load treatment with -8,49%) than the ones of the standard procedure.

6 Especially, the values obtained in the alternative testing cannot be compared with the declared values (because this model cannot achieve the standard requirements in the treatment full); but having in mind that it behaves in the same way in the standard test and in the alternative test, those results can be compared.

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4.2.3.2.2 Programme time

Table 4-9: Case DRIER2. Model B. Programme time

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat.vs declared	Alternat. vs standard
Treatment half (min)	125	124	124	0,81%	0,00%	-0,80%
Treatment full (min)	290	274	230	26,09%	19,13%	-5,52%
Average (min)	196	189	169	15,98%	11,83%	-3,57%

For the programme time, the results of the alternative procedure are lower (on average -3,57%) than the ones of the standard procedure.

4.2.3.2.3 Condensation efficiency

Table 4-10: Case DRIER2. Model B. Condensation efficiency and class

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat.vs declared	Alternat. vs standard
Treatment half (%)	97,7	95,9	91	7,36%	5,38%	-1,84%
Treatment full (%)	26,2	67,9	91	-71,21%	-25,38%	159,16%
Average (%)	67	83,9	91	-26,37%	-7,80%	25,22%
Condensation efficiency class	D	B	A			

The results of the alternative procedure are more favourable (on average 25,22%) than the ones of the standard procedure.

4.2.3.3 Model C

The results obtained for the different parameters are detailed below:

4.2.3.3.1 Energy consumption

Table 4-11: Case DRIER2. Model C. Energy consumption, , energy efficiency class and EEI

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat.vs declared	Alternat. vs standard
Treatment half (kWh)	0,78	0,78	0,83	-6,02%	-6,02%	0,00%
Treatment full (kWh)	1,39	1,41	1,47	-5,44%	-4,08%	1,44%
Average (kWh)	1,04	1,05				0,96%
Annual energy consumption	166,5	168	176,5	-5,67%	-4,82%	0,90%
EEI	22,5	22,7				
Energy efficiency class	A+++	A+++	A+++			

The results of the alternative procedure are only slightly higher (up to 1,44%) than the ones of the standard procedure.

4.2.3.3.2 Programme time

Table 4-12: Case DRIER2. Model C. Programme time

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat.vs declared	Alternat. vs standard
Treatment half (min)	88	87	97	-9,28%	-10,31%	-1,14%
Treatment full (min)	145	145	152	-4,61%	-4,61%	0,00%
Average (min)	113	112	121	-6,61%	-7,44%	-0,88%

The results of the alternative procedure are only slightly lower (on average -0,88%) than the ones of the standard procedure.

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4.2.3.3.3 Condensation efficiency

Table 4-13: Case DRIER2. Model C. Condensation efficiency and class

	Standard test conditions	Alternat. test conditions	Declared	Standard vs declared	Alternat. vs declared	Alternat. vs standard
Treatment half (%)	95,4	94,7	91	4,84%	4,07%	-0,73%
Treatment full (%)	93,7	93,7	91	2,97%	2,97%	0,00%
Average (%)	94,7	94,2	91	4,07%	3,52%	-0,53%
Condensation efficiency class	A	A	A			

The results of the alternative and the standard procedure are very similar.

4.2.4 Conclusions about this case

According to the flow chart (see section 3, Figure 3-1), this case at the general level, i.e. (hidden) software solely reacting to the test situation, initially provided (theoretical) "hints for circumvention" according the definition included in chapter 2 of this report, in particular corresponding to section a) of the definition:

"Circumvention is the act of designing a product or prescribing test instructions, leading to an alteration of the behaviour or the properties of the product, specifically in the test situation, in order to reach more favourable results for any of the parameters specified in the relevant delegated or implemented act, or included in any of the documentations provided for the product. The act of circumvention is relevant only under test conditions and can be executed a) by automatic detection of the test situation and alteration of the product performance and/or resource consumption during test."

Different conclusions can be drawn depending on the tested models:

<u>Model A</u>

According to regulations 932/2012 and 392/2012 the verification tolerance for market surveillance purposes concerning energy consumption and programme time is 6%. If the 6% are used as a reference for determining how important the deviation between the standard and the alternative procedure for these parameters is, it can be concluded that the difference between the values obtained in the standard and the alternative procedure is not relevant.

The values obtained in the tests for the energy consumption and programme time according to the alternative procedure would conform with the requirements of the EL/ED regulations.

The condensation efficiency being highly affected by the alternative testing procedure is striking. The results obtained in the alternative tests for this parameter would not conform with the requirements of the EL/ED regulations. To understand the underlying reasons, however, it would be necessary to repeat the tests several times (not possible within the scheduled duration of the Task in the ANTICSS project) to confirm this behaviour and being able to conclude that this might be circumvention. According to the feedback of ANTICSS Advisory Board members, the fluctuations in condensation efficiency might be caused by the presence of some condensated water corresponding to the previous cycle when beginning the test, probably because the last pumping out was not carried out. They consider that the cause of this behaviour is not the alternative test condition but the test being finished too early.

Model B

This model does not comply with the requirements of the harmonised standard and does not conform the requirements of the EL/ED regulations. Also the values obtained in the alternative test procedure would not conform with the requirements of the EL/ED regulations.

Model C

According to regulations 932/2012 and 392/2012 the verification tolerance for market surveillance purposes concerning energy consumption, programme time and condensation efficiency is 6%. If the 6% are used as a reference for determining how important the deviation between the standard and the alternative procedure is, it can be concluded that the difference between the values obtained in the standard and the alternative procedure is not relevant.

All the values obtained in the tests performed for ANTICSS project (standard and alternative procedures) are more favourable for the consumer, i.e. “better” than the declared ones. There are no relevant differences between the values obtained in the tests of the standard and the values obtained in the tests according the alternative procedure. So, the initial (theoretical) hint for circumvention has not been confirmed for this tested model. Also the values obtained in the tests according to the alternative procedure would conform with the requirements of the EL/ED regulations.

Regarding the assessment of the alternative testing method, the variation of the supply voltage provides a test condition that is more likely to happen in real life conditions than the test condition required by the harmonised standard. We consider that the alternative testing method is generally suitable for disclosing the suspicious behaviour in cases similar to this one.
The number of tests runs in the alternative testing method was reduced from 7 as required by the harmonised standard to 4 test runs which is considered sufficient for comparing the results with the results of the tests according to the harmonised standard. This kind of reduction might be applied by MSAs in market surveillance tests for detecting circumvention but not for the compliance verification procedure according to the EL/ED regulations.

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4.3 Summary of results of this product category

The following tables provide a summary of the results of cases and models tested in the product category household tumble driers:

ANTICSS standard test results

Both Model A and Model C are conforming with the requirements of the Ecodesign and Energy labelling regulations, whereas Model B is non-conforming to the requirements of the Ecodesign and Energy labelling regulations according to the harmonized standard test.

Table 4-14: Overview of the standard test results of cases and models tested in the product category household tumble driers

Standard test	Model A	Model B	Model C
Standard test	Conforming	**Not conforming**	Conforming

ANTICSS alternative test results

For Case DRIER1, the general case, i.e. provision of specific test instructions (specific pre-treatment) solely for test laboratories, is categorised as “hint for circumvention”. For the tested Model A, no circumvention has been detected, i.e. the deviations of the standard and alternative test results are not relevant.

For Case DRIER2, the general case, i.e. suspicion of specific software to detect and react to the standard measurement, is categorised as “hint for circumvention”. For the tested models, no circumvention has been detected, i.e. the deviations of the standard and alternative test results are not relevant.

Table 4-15: Overview of the ANTICSS alternative test results of cases and models tested in the product category household tumble driers

Alternative test	Model A	Model B	Model C
Case DRIER1		Not tested	Not tested
Case DRIER2			

ANTICSS colour legend:

General level (Case)	Product level (tested Model)
Yellow: Jeopardy effect Orange: Hints for Circumvention	Green: No Circumvention Dark orange: Borderline to circumvention Red: Circumvention

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Austria: BMDW - Bundesministerium Digitalisierung und Wirtschaftsstandort

Czech Republic: SEVEn - SEVEn, the Energy Efficiency Center, z.u.

Czech Republic: SEIA - Státní energetická inspekce

EU / Belgium: ECOS - European Environmental Citizens Organisation for Standardisation

Belgium: BHTC - Service public federal sante publique, securite de la chaine alimentaire et environnement

Germany: OEKO – Oeko-Institut e.V., Institut für Angewandte Ökologie

Germany: UBONN - Rheinische Friedrich-Wilhelms-Universitat Bonn

Germany: GRS - Regierung von Schwaben – Gewerbeaufsichtsamt

Germany: VDE - VDE Prüf- und Zertifizierungsinstitut GmbH

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Italy: CCIAA Mi - Camera di commercio industria artigianato agricoltura

Italy: IMQ - Istituto Italiano del Marchio di Qualità S.p.A.

Netherlands: Re/gent - Re/gent B.V.

Netherlands: NVWA - Nederlandse voedsel en warenautoriteit

Portugal: ADENE - Adene-agencia para a energia

Portugal: ASAE - Autoridade seguranca alimentar e economica

Spain: FFII – LCOE - Fundacion para el fomento de la innovacion industrial

Spain: CM - Comunidad de Madrid

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ANTICSS Project Deliverable D18 (D4.5):

Test Reports – Part 7: Household tumble driers

ANNEX: Test laboratory report

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