ANTICSS Project
Deliverable D18 (D4.5):
Test Reports – Part 2:
Televisions
– draft final version –

Organisation name of lead author of this document: FFII-LCOE
Project coordinator: Kathrin Graulich
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<th>Anti-Circumvention of Standards for better market Surveillance</th>
</tr>
</thead>
<tbody>
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<td>&lt;FFII-LCOE&gt;</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Heinz Lemke (VDE); Christoph Türk (VDE); Sonia Martin (FFII-LCOE); Randolph van Kasteren (Re/genT); Ina Hook (VDE); Stefano Ferrari (IMQ); Kathrin Graulich (OEKO); Ina Rüdenauer (OEKO); Christian Praher (AEA); Milena Presutto (ENEA); Rainer Stamminger (UBONN)</td>
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</tr>
</tbody>
</table>
Table of Content

1 About the ANTICSS project ................................................................. 4
2 ANTICSS definition of circumvention and jeopardy effects ............... 5
3 Goal and general approach of this work package ............................... 6
4 Televisions ......................................................................................... 12
  4.1 Case TV1 ....................................................................................... 12
  4.1.1 Description of the case ............................................................. 12
  4.1.2 Alternative testing procedure .................................................. 12
  4.1.3 Summary of results ................................................................. 13
  4.1.4 Conclusions about this case ..................................................... 16
  4.2 Case TV2/3 .................................................................................... 17
  4.2.1 Description of the case ............................................................. 17
  4.2.2 Alternative testing procedure .................................................. 17
  4.2.3 Summary of results ................................................................. 18
  4.2.4 Conclusions about this case ..................................................... 22
  4.3 Summary of results of this product category ................................... 25
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 testing1.

**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.”

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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.anticircumvention.eu/storage/app/media/uploaded-files/D08_ANTICSS_Final-definitions_circumvention.pdf](https://www.anticircumvention.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

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

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.

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) 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.

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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 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 Board⁴ 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.

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

ANTICSS categorises cases and tested models to circumvention and jeopardy effects.
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)
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.
4 Televisions

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 televisions

<table>
<thead>
<tr>
<th>Case</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case TV1</td>
<td>Tested</td>
<td>Tested</td>
<td>Tested</td>
</tr>
<tr>
<td>Case TV2/3</td>
<td>Tested</td>
<td>Tested</td>
<td>Tested</td>
</tr>
</tbody>
</table>

4.1 Case TV1

4.1.1 Description of the case

According to standard IEC 62087-2:2015 (specified signals, screen resolution and media), TV’s power input is measured at factory setting. In the reported case, it was observed that the power consumption increased, if the factory setting was adjusted manually for the first time. In concrete terms, the brightness value was 45 in factory settings, corresponding to 71 W. However, if the brightness decreased by one point to a value of 44, TV’s power increased to 90 W. Even if the brightness was set back to the factory settings (45), the power consumption remained high.

4.1.2 Alternative testing procedure

Prior to the alternative testing procedure, the appliance will be installed and parameters for the power consumption will be measured according to Ecodesign regulation 642/2009 and the harmonised standard IEC 62087-2:2015; tests will be conducted with factory settings according to the standard conditions. After that, the settings of luminance and backlight will be changed and then reset again to the factory settings. The same parameters for the power consumption will be measured after these changes and compared to the results of the corresponding tests performed under initial factory settings. The purpose of this alternative testing method is to evaluate if the factory settings are possibly targeted to the meet the requirements of the standard testing only.
4.1.3 Summary of results

4.1.3.1 Model A

The results for changing settings of luminance/backlight reset to Factory (Automatic Brightness control “ABC” off) obtained for the different parameters are detailed below:

![Power consumption curve](image)

Figure 4-1: Power consumption curve after changing settings and reset to factory

<table>
<thead>
<tr>
<th></th>
<th>Standard test condition</th>
<th>Alternative test condition</th>
<th>Declared</th>
<th>Standard vs declared</th>
<th>Alternat. vs declared</th>
<th>Alternat. vs standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Mode-Power Consumption (W):</td>
<td>85</td>
<td>85</td>
<td>110</td>
<td>-23%</td>
<td>-23%</td>
<td>0%</td>
</tr>
<tr>
<td>Annual Power Consumption (kWh/a):</td>
<td>118</td>
<td>118</td>
<td>153</td>
<td>-23%</td>
<td>-23%</td>
<td>0%</td>
</tr>
<tr>
<td>Energy Efficiency Index:</td>
<td>0,2160</td>
<td>0,2160</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy label class:</td>
<td>A+</td>
<td>A+</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no difference in power consumption after reset to the regular standard method between the alternative and the standard tests conditions. However, it is rather noticeable that the measured values deviate by minus 23% from the declared values. Also, the energy class resulting from the measured values (both standard and alternative measurement) would be more favourable (A+) than the energy class (A) declared by the manufacturer.
4.1.3.2 Model B

The results for changing settings of luminance/backlight reset to Factory obtained for the different parameters are detailed below:

![Power consumption curve after changing settings and reset to factory](image)

**Figure 4-2: Power consumption curve after changing settings and reset to factory**

**Table 4-3: Results Case TV1 - Model B**

<table>
<thead>
<tr>
<th></th>
<th>Standard test condition</th>
<th>Alternative test condition</th>
<th>Declared</th>
<th>Standard vs declared</th>
<th>Alternat. vs declared</th>
<th>Alternat. vs standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Mode-Power Consumption (W):</td>
<td>57</td>
<td>54</td>
<td>66</td>
<td>-14%</td>
<td>-18%</td>
<td>-5%</td>
</tr>
<tr>
<td>Annual Power Consumption (kWh/a):</td>
<td>83</td>
<td>79</td>
<td>96</td>
<td>-14%</td>
<td>-18%</td>
<td>-5%</td>
</tr>
<tr>
<td>Energy Efficiency Index:</td>
<td>0,1354</td>
<td>0,1292</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy label class:</td>
<td>A++</td>
<td>A++</td>
<td>A++</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is only slight difference (minus 5%) in power consumption after reset to the regular standard method between the alternative and the standard tests conditions. However, it is rather noticeable that the measured values deviate by -14% to -18% from the declared values, although without any effect on the energy class (A++ for all measured and declared values).
4.1.3.3 Model C

The results for changing settings of luminance/backlight reset to Factory obtained for the different parameters are detailed below:

![Power Consumption Curve](image)

**Figure 4-3:** Power consumption curve after changing settings and reset to factory

**Table 4-4:** Results Case TV1 - Model C

<table>
<thead>
<tr>
<th></th>
<th>Standard test condition</th>
<th>Alternative test condition</th>
<th>Declared</th>
<th>Standard vs declared</th>
<th>Alternat. vs declared</th>
<th>Alternat. vs standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On-Mode-Power Consumption (W):</strong></td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Annual Power Consumption (kWh/a):</strong></td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Energy Efficiency Index:</strong></td>
<td>0,1582</td>
<td>0,1582</td>
<td>0,1582</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Energy label class:</strong></td>
<td>A++</td>
<td>A++</td>
<td>A++</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no difference at all in power consumption after reset to the regular standard method between the alternative and the standard tests conditions. Further, the measured results are exactly the same as declared.
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 factory settings not reverting after changing the settings in the menu, 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 e.g. b) by pre-set or manual alteration of the product, affecting performance and/or resource consumption during test.”

The purpose of alternative testing method Case TV1 is to evaluate if the factory settings are possibly targeted to meet the requirements of the standard testing only and to find out if a manufacturer has special settings for the first installation which cannot be recapitulated after changing settings in the menu. However, 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. All three tested models came back to the initial factory settings after changing brightness/backlight and resetting. So, the initial hint of circumvention has not been confirmed for these three tested models. Also, both the values obtained in the standard and alternative tests conform with the requirements of the EL/ED regulations.

Interesting was to see that the manufacturer of Model A declared an on-mode power consumption of 110 W with an EEI leading to energy efficiency class A, whereas under standard testing an average input power of only 85 W (minus 23%) was measured which corresponds to the energy efficiency class A+. Upon request, the manufacturer stated to add this safety margin because of variation between units resulting of the construction process to ensure that when MSA test their TV with regard to the power consumption all units are compliant.

The proposed method is generally suitable for disclosing the suspicious behaviour and easy to apply by MSA; the additional effort is low. To check if this kind of circumvention is applied it is necessary to measure twice. It would be sufficient to take a test pattern like 3-Bar as provided by IEC 62087-2:2015. The first check is to measure power consumption after first installation, the second one after changing settings and reset to factory settings.
4.2 Case TV2/3

4.2.1 Description of the case

According to standard IEC 62087-2:2015, the energy consumption of TVs is tested with default settings. The standardised test movie, which is used for measuring the energy consumption, only consists of fast-moving images. Prior to the start of the standardised test movie, a countdown clip is shown. This countdown lasts for 10 seconds and does not contain any fast-moving images. After the 10 seconds, the movie content is played. In the reported case, an automatic brightness adjustment function was activated by default. This function analysed the broadcast program and when fast moving images were detected, the brightness of the television was reduced automatically. As a result, the measured energy consumption of the television was significantly lower compared to a broadcast video without fast moving images (reduction of the input power of approximately 35%).

4.2.2 Alternative testing procedure

STANDARD TESTING PROCEDURE:

Prior to the alternative testing procedure, the appliance will be installed and parameters for the power consumption will be measured according to Ecodesign regulation 642/2009 and the harmonised standard IEC 62087-2:2015; the power consumption will be noted for the 10-minute loop of the dynamic test sequence according to IEC 62087-2:2015. The 10 minutes sequence of the test video to be used for the standard measurement according to IEC 62087-2 is far away from the average TV viewing. It includes hard cuts every few seconds which makes it easy to recognize this sequence as a test video and to implement special functions to reduce the luminance (backlight or OLED) during this loop which decrease the power consumption specifically in the test situation.

ALTERNATIVE TESTING PROCEDURE A) ON MODE POWER CONSUMPTION: 50/50

Assuming that the trigger for a possible brightness adjustment function might be the specific start sequence of the test video, for the evaluation of this suspected test sequence recognition, the 10 min video of the IEC 62087-2 is divided in two parts. Measurement of power consumption is running first for the last 5 min and then the first 5 min. Finally, the test result is compared to the regular 10 min sequence. But this let not result that there is a special function for detecting test condition especially the video clip from IEC 62087-2.

ALTERNATIVE TESTING PROCEDURE B) ON MODE POWER CONSUMPTION: MEASUREMENT STARTING AFTER 3 MINUTES

The power consumption will be measured using the same standard video loop but starting the measurement only 3 minutes after the video has started, i.e. 3 minutes later compared to the standard measurement. To ensure a 10 minute measurement and to keep the Average Picture Level (APL) of 34% it`s necessary to fit the missing first 3 minutes directly to the end of the video.
The purpose of this alternative testing method is to evaluate the possible effects of adaptations under test. If for example a reduction of the brightness takes place during the first minutes of the testing, the test results would be slightly different if this period would not be taken into account when measurement starts only after the reduction is already finished.

4.2.3 Summary of results

4.2.3.1 Model A

The results for measuring the on mode power consumption with the sequences of the test video changed (“50/50”) and “measurement starting after 3 minutes” are detailed below:

![Graphs showing power consumption comparison](image)

Figure 4-4: Results of Case TV2/3, Model A: On mode Power Consumption: “50/50” (left picture); “measurement starting after 3 minutes” (right picture)

Table 4-5: Results Case TV2/3 - Model A

<table>
<thead>
<tr>
<th></th>
<th>Standard test condition</th>
<th>Alternative test conditions (50:50 / 3 min)</th>
<th>Declared</th>
<th>Standard vs declared</th>
<th>Alternat. vs declared</th>
<th>Alternat. vs standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>“50/50” On-Mode-Power Consumption (W):</td>
<td>85</td>
<td>86</td>
<td>110</td>
<td>-23%</td>
<td>-22%</td>
<td>1%</td>
</tr>
<tr>
<td>“Starting after 3 minutes” On-Mode-Power Consumption (W)</td>
<td>85</td>
<td>83</td>
<td>110</td>
<td>-23%</td>
<td>-24%</td>
<td>-2%</td>
</tr>
<tr>
<td>Annual Power Consumption (kWh/a)</td>
<td>118</td>
<td>119 / 115</td>
<td>153</td>
<td>-22,9%</td>
<td>-22,3% / -24,9%</td>
<td>0,8% / -2,5%</td>
</tr>
<tr>
<td>Energy Efficiency Index:</td>
<td>0,2160</td>
<td>0,2179 / 0,2107</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy label class:</td>
<td>A+</td>
<td>A+ / A+</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For measuring the on mode power consumption with the sequences of the test video changed (“50/50”), the results of the alternative test condition only deviate by 0.8% from the standard test results. For the measurement starting only after 3 minutes, the test result of the alternative test procedure is deviating by -2.5% from the standard results because of the TV reduced already power within the first 3 minutes and is stable in this function. According to regulations 642/2009 and 1062/2010 the verification tolerance for market surveillance purposes concerning on-mode power consumption is 7%. If this 7% are used as a reference for determining the importance of the deviation between the standard and the alternative procedure, it can be concluded that the differences between the values obtained in the standard and the alternative procedure for Model A are not relevant.

However, it is rather striking that the measured values deviate by minus 24% from the declared values; in this case, the energy class resulting from the measured values would be even more favourable (A+) than the energy class (A) as declared by the manufacturer.

4.2.3.2 Model B

The results for measuring the on mode power consumption with the sequences of the test video changed (“50/50”) and “measurement starting after 3 minutes” are detailed below:

Figure 4-5: Results of Case TV2/3, Model B: On mode Power Consumption: “50/50” (left picture); “measurement starting after 3 minutes” (right picture)
Table 4-6: Results Case TV2/3 - Model B

<table>
<thead>
<tr>
<th></th>
<th>Standard test condition</th>
<th>Alternative test conditions (50:50 / 3 min)</th>
<th>Declared</th>
<th>Standard vs declared</th>
<th>Alternat. vs declared</th>
<th>Alternat. vs standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>“50/50” On-Mode-Power Consumption (W):</td>
<td>57</td>
<td>59</td>
<td>66</td>
<td>-14%</td>
<td>-11%</td>
<td>1%</td>
</tr>
<tr>
<td>“Starting after 3 minutes” On-Mode-Power Consumption (W):</td>
<td>57</td>
<td>54</td>
<td>66</td>
<td>-14%</td>
<td>-22%</td>
<td>-5%</td>
</tr>
<tr>
<td>Annual Power Consumption (kWh/a):</td>
<td>83</td>
<td>86 / 79</td>
<td>96</td>
<td>-13,5%</td>
<td>-10,4% / 3,6%</td>
<td>-17,7% / -4,8%</td>
</tr>
<tr>
<td>Energy Efficiency Index:</td>
<td>0,1354</td>
<td>0,1412 / 0,1292</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy label class:</td>
<td>A++</td>
<td>A++ / A++</td>
<td>A++</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For measuring the on mode power consumption with the sequences of the test video changed ("50/50"), the results of the alternative test condition deviate by 3,6% from the standard test results. For the measurement starting only after 3 minutes, the alternative test result is deviating by minus 3W (-4,8%) from the results of the standard testing. According to regulations 642/2009 and 1062/2010 the verification tolerance for market surveillance purposes concerning on-mode power consumption is 7%. If this 7% are used as a reference for determining the importance of the deviation between the standard and the alternative procedure, it can be concluded that the differences between the values obtained in the standard and the alternative procedure for Model B are not relevant.

Finally, it is rather striking that the measured standard values deviate by -14% from the declared values, however, with no effect on the energy class (A++ for all measured and declared values).
4.2.3.3 Model C

The results for measuring the on mode power consumption with the sequences of the test video changed ("50/50") and "measurement starting after 3 minutes" are detailed below:

![Graph showing power consumption](image1)

![Graph showing power consumption](image2)

Figure 4-6: Results of Case TV2/3, Model C: On mode Power Consumption: “50/50” (left picture); “measurement starting after 3 minutes” (right picture)

<table>
<thead>
<tr>
<th>Standard test condition</th>
<th>Alternative test conditions (50:50 / 3 min)</th>
<th>Declared</th>
<th>Standard vs declared</th>
<th>Alternat. vs declared</th>
<th>Alternat. vs standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>“50/50” On-Mode-Power Consumption (W):</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>“Starting after 3 minutes” On-Mode-Power Consumption (W):</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Annual Power Consumption (kWh/a):</td>
<td>87</td>
<td>87 / 87</td>
<td>87</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Energy Efficiency Index:</td>
<td>0,1582</td>
<td>0,1582 / 0,1582</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy label class:</td>
<td>A++</td>
<td>A++ / A++</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For both, measuring the on mode power consumption with the sequences of the test video changed ("50/50") and the measurement starting only after 3 minutes, the results of the alternative test condition are exactly the same as for the standard test results. Also, all measured values exactly match the declared values.
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. a smart function/energy saving software or technology – specific but presumably not solely applicable in test situation, was initially categorized as “jeopardy effect” according the definition included in chapter 2 of this report:

“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.”

The test results of all three models obtained in the standard and alternative tests conform with the requirements of the EL/ED regulations.

The purpose of alternative testing method Case TV2/3 is to evaluate if televisions have a function which reduces the brightness of the television automatically when the fast moving images of the standard video test sequence according to IEC 62087-2, that rarely apply in real television programmes are detected resulting in a significantly lower energy consumption of the television compared to a broadcast video without fast moving images.

The measurements revealed that Model A has a special function to detect fast changing content. This let reduce the backlight (finally the power) step by step (see left picture in Figure 4-4), starting at about 95 W at the start of the test video, and settling down at about 85 W after 100 seconds for the rest of the test sequence. The results of the applied ANTISS alternative test measures (change of the order of the test video sequences or start of the measurement only after 3 minutes) did not lead to relevant deviations to the test results of the standard measurement. This means, that not the specific start sequence of the standard test video triggered the backlight reduction but that the detection of the fast moving pictures was independing from the initial sequence of the standard test video; further, the reduction behaviour becomes already apparent in the test pattern/graph of the standard testing.

For Model A, the power consumption measured with the reduced backlight was 85 W (energy efficiency class A+); however, the power consumption declared by the manufacturer is much higher (110 W, even resulting in a lower energy efficiency class A). Upon request, the manufacturer stated to add this as safety margin because of variation between units resulting of the construction process to ensure all units being compliant when MSA test their TV with regard to the power consumption. In this case, the manufacturer did not use the backlight reducing function to reach more favourable results for the parameters to be declared.
It is not clear from the ANTICSS test results if the technology reduces the power consumption by altering screen brightness also with any content that has rapid scene changes and/or content depicting a large amount of motion in real life such as for example sports programmes with fast moving content and scene changes as claimed by the manufacturer. If the backlight reduction function only detects the specific fast moving images of the standard test video under IEC 62087-2, which is rather different to real life broadcast content, this would rather fall under “hints for circumvention” then (see flow chart in section 3, Figure 3-1). To clarify this, however, a separate test would be necessary selecting different video content with a high degree of movement/change between frames which was not possible within the framework of the ANTICSS project.

Model B and Model C do not have smart functions like detecting fast-changing content and automatic brightness adjustment function. Therefore, the test results could not reveal any recognition especially for this test video by decreasing the backlight and respectively the power.

Further, the proposed ANTICSS alternative test method has not proven to be suitable to disclose the suspicious behavior; the application of a backlight reduction function is already visible under standard testing. The special measurement by changing the timing of the IEC video content requires much more burden compared to the standard test and does not provide the envisaged results.

**GENERAL DISCUSSION OF THIS CASE:**

The test video prescribed by the IEC 62087:2015 standard with its specific fast-moving sequences that do not apply in most real life broadcasting still offers a loophole:

The test results show that televisions might have a built-in function being able to recognize specific fast-moving sequences and reduce the energy consumption specifically under test; although not exploited by the tested Model A, it cannot be ruled out that other manufacturers or models might use such a technical feature under standard testing to reach more favourable values for the on-mode power consumption or the energy efficiency class on the label.

Even if this special function also works on all inputs (Tuner/External) and would be applicable in fast-moving programmes like some kind of sports, it will not be used in the majority of programmes chosen by end consumers in real life. This means that the backlight reduction function certainly provides an advantage of power saving under standard testing whereas this can rather seldom or not at all be realized under real-life conditions (this would be “borderline to circumvention” according to the flow chart (cf. section 3, Figure 3-1). Also, it does not provide reliable information about the resource consumption and/or performance of the product to consumers.

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* A disadvantage is that this function also reduces the brightness of the display which is rather not in the interest of the consumer.

Further, since the existing TV test method was adopted in 2007, markets have shifted towards larger, brighter
Taking this into account, recently another test procedure has been developed by CLASP's Europe program: A new ten-minute test video sequence that can serve as an alternative to the existing IEC 62087:2015 test video to measure the energy consumption of HDR televisions. This new HDR video was developed as part of a project called “Smart Testing of Energy Products” (STEP), which is funded by the ClimateWorks Foundation and the European Climate Foundation. The alternative test video takes into account and better reflects normal program content compared to the IEC 62087 standard test sequence: it offers the same average picture level (34%) as IEC but has fewer cuts in the video content, thus making it more representative of normal program content. The video clip was prepared in five formats: UHD-4K-HDR-10, UHD-4K-HDR-8, UHD-4K, HD and SD. The video clip itself contains a variety of custom-filmed clips of street scenes, sports, advertising and clips from a staged television drama and news talk-show.7

Currently the harmonized standard for testing of televisions with regard to the requirements of the new Ecodesign regulation 2019/2013 is under revision.

7 For more details, see https://clasp.ngo/updates/2016/new-video-test-sequence-for-televisions
4.3 Summary of results of this product category

The following provides a summary of the results of cases and models tested in the product category televisions:

**ANTICSS standard test results**

Model A, Model B and Model C are all conforming with the requirements of the Ecodesign and Energy labelling regulations according to the harmonized standard test.

Table 4-8: Overview of the standard test results of cases and models tested in the product category televisions

<table>
<thead>
<tr>
<th>Standard test</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard test</td>
<td>Conforming</td>
<td>Conforming</td>
<td>Conforming</td>
</tr>
</tbody>
</table>

**ANTICSS alternative test results**

For Case TV1, the general case, i.e. specific factory settings not reverting after changing settings in the menu (leading to increased power consumption when default brightness setting is changed), is categorized as “hints 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.

For Case TV2/3, no circumvention has been detected for the tested Model B and Model C. For Model A, the ANTICSS testing revealed that it uses a technology for detecting fast-changing content as applied in the standard test video and activating an automatic backlight reduction function under test. The general case could be either classified as “jeopardy effect” (following the manufacturer’s explanation that the function is also applicable to fast moving pictures of real-life broadcasting content), or as “hint for circumvention” (following the experience of the test lab that such fast moving pictures never apply in real-life and therefore the software solely reacts to the specific test video – which however could not be proven in ANTICSS). For Model A it was not made use of it in the sense of the ANTICSS definition of circumvention to reach more favourable results. However, in general the act of circumvention not found in that specific tested model can still be considered potentially applicable to other models of the product category.

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8 On the contrary, the declared values were significantly higher (23%) compared to the measured values which even resulted in a lower energy efficiency class (declared A instead of measured A+). According to the manufacturer, this is a safety margin added because of variation between units resulting of the construction process to ensure all units being compliant when MSA test their TV with regard to the power consumption.
Table 4-9: Overview of the ANTICSS alternative test results of cases and models tested in the product category televisions

<table>
<thead>
<tr>
<th>Alternative test</th>
<th>Model A</th>
<th>Model B</th>
<th>Model C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case TV1</td>
<td>Yellow</td>
<td>Green</td>
<td>Yellow</td>
</tr>
<tr>
<td>Case TV2/3</td>
<td>Orange</td>
<td>Green</td>
<td>Orange</td>
</tr>
</tbody>
</table>

ANTICSS colour legend:

<table>
<thead>
<tr>
<th>General level (Case)</th>
<th>Product level (tested Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow: Jeopardy effect</td>
<td>Green: No Circumvention</td>
</tr>
<tr>
<td>Orange: Hints for Circumvention</td>
<td>Dark orange: Borderline to circumvention</td>
</tr>
<tr>
<td></td>
<td>Red: Circumvention</td>
</tr>
</tbody>
</table>
Contact:

www.anti-circumvention.eu
https://twitter.com/anticircumvent
https://www.linkedin.com/company/anticss/

Project coordinator:

Ms. Kathrin Graulich
Deputy Head of Sustainable Products and Material Flows Division
Oeko-Institut e.V.
P.O. Box 17 71 | 79017 Freiburg Germany
Email: K.Graulich@oeko.de
www.oeko.de

List of project partners:

Austria: AEA - Österreichische Energieagentur
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
Italy: ENEA- Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile
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