

REPORT

Client: Birgitte Brange  
Elsparefonden  
Danneskiold-Samsøes Alle 55  
1434 København K  
Denmark

Report  
issued by:



Davy Avenue  
Knowlhill  
Milton Keynes  
MK5 8NL

Tel. +44 (0)1908 857777  
Fax. +44 (0)1908 857830

AUTHORISED  
FOR ISSUE: .....

A handwritten signature in blue ink, appearing to read "V. Elliott", is written over the dotted line of the "FOR ISSUE" field.

Vanessa Lelliott  
Electronic Products Manager

DATE: January 2010

REPORT AUTHORS: Stephen Fernandes, Michael Mead

**E66102 Issue 3**

**Danish iDTVs 2009**

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. Taken on its own, this report should not be used for regulatory purposes e.g. declaring conformance with directives.

**CONTENTS**

<b>SECTION</b>	<b>PAGE</b>
<b>SUMMARY</b>	<b>3</b>
<b>1. Introduction</b>	<b>5</b>
<b>2. Sample Condition</b>	<b>5</b>
<b>3. Inventory</b>	<b>6</b>
3.1 Relevant Features and Settings	6
<b>4. Power Consumption Measurements</b>	<b>8</b>
4.1 Sample Preparation	8
4.2 Measurements	9
<b>Appendix I</b>	<b>12</b>
Test Programme	12
<b>Appendix II</b>	<b>14</b>
Brand List	14
<b>Appendix III</b>	<b>16</b>
EC Regulation 642/2009 for Televisions Significant Dates	16
<b>Appendix IV</b>	<b>18</b>
Test Equipment Set-up	18

## SUMMARY

- A total of twenty one televisions were tested for Elsparefonden, (the Danish Energy Saving Trust) comprising 22-47" widescreen televisions.
- Tests conducted related to energy consumption measurements with specific reference to the EU Regulation 642/2009/EC for Televisions.
- With reference to power consumption, the EU Regulation 642/2009/EC for Televisions specifies off-mode, standby-mode and on-mode criteria. ANNEX III, VERIFICATION PROCEDURE of the regulation allows an extra 0.10 watt for off-mode and standby-mode, 7% more power for on mode and 5% less luminance in default picture mode.
- All samples tested used liquid crystal display (LCD) screen technology, five of these had light emitting diode (LED) backlights and sixteen had cold cathode fluorescent (CCFL) backlights.
- Six of the samples had mechanical on/off-switches which resulted in <0.01 watt power consumption in off-mode.
- Thirteen of the samples had 1920 x 1080 pixel resolution display panels providing them an extra allowance for on-mode power consumption.
- Five samples had an automatic inactivity power-down feature which switches the television to standby-mode within four hours of the last user intervention or channel change, but this was not enabled by default on one of the samples.
- Six of the samples did not satisfy the minimum default luminance criteria of 65% of the brightest preset mode. However, two of these meet the allowed criteria for verification testing of 60% of the brightest preset mode.
- When the screen luminance in the default mode was adjusted to be 65% of the brightest preset mode, these six samples passed the on-mode power consumption criteria for 20 August 2010 and 1 April 2012, so these samples would pass all on-mode power consumption and minimum luminance requirements by adjusting the default luminance setting.
- Nine codes feature an Automatic Brightness Control (ABC), which automatically varied the backlight to suit ambient lighting conditions. However, four of these did not have this enabled by default.
- All samples tested meet the minimum standby and off-mode power consumption criteria from 7 January 2010. One sample would fail the off-mode criteria and another sample fails the standby-mode criteria from 20 August 2011.
- All of the codes pass the minimum on-mode power consumption requirements up to 20 August 2011. Three samples fail the on-mode requirements as of 1 April 2012, of which two pass if given the extra 7% allowance for verification testing.

- All samples were within Energy Efficiency classes A to D as specified in ANNEX II of the DRAFT (April 2009) TV Labelling Directive, with an almost even spread from A to C and one "D Class" sample.
- All codes were found to be within the manufacturers' off-mode, standby-mode and on-mode power consumption claims, where claims were made.

## 1. Introduction

This report gives an overview of the tests carried out and the results and should be read in conjunction with the Excel table 'E66102 Danish iDTVs Results Table Issue 2' (Issue 2 includes manufacturer's power consumption claims and Energy Efficiency Index calculations) which is supplied as a separate document to accompany this report. Where particular tests are referred to in this report, the corresponding row number(s) in the results table are denoted in the following form: [rows xx-yy].

This Issue 3 of the Technical Report replaces Issue 2 and includes an evaluation of the measured on-mode power consumption in relation to the Regulation 642/2009/EC requirements, measured power consumption in relation to manufacturer's claims and calculation of the Energy Efficiency Index of all samples within the summary.

All testing was carried out at Intertek, Milton Keynes during December 2009.

The tests have been carried out in accordance with the test programme, **Appendix I**, and as such, the results are only applicable to the sample tested and the conditions of the test. Sample variability and changes in test conditions could influence some results, and the result(s) as stated may not be representative of the mean result if a number of different samples were tested under a variety of test conditions.

Taken on its own, this report should not be used for regulatory purposes e.g. declaring conformance with directives.

## 2. Sample Condition

The twenty one televisions supplied by the client were not all brand new, boxed samples. Fifteen of the supplied televisions were in sealed boxes and considered to be brand new samples. Three televisions (codes DAB1, DAC1 and DAU1) were delivered in unsealed boxes and had been previously used. The remaining three samples (codes DAE1, DAN1 and DAS1) did not have boxes, arriving instead wrapped in bubble wrap and having been previously used. Of the six televisions that were not brand new, two of them (codes DAN1 and DAU1) arrived without pedestal stands.

Where possible, the previously used televisions were given a 'return to default' or 'factory reset' operation. For the Philips televisions (codes DAE1 and DAS1) this was not possible, although default picture and sound settings were activated. This resulted in the inability to confirm whether or not these two sets had a 'Home' or 'Store' question during the initial set up procedure. Therefore that data could not be entered in the results table.

The Dantax sample received (code DAA1) had a model number: 22LCD/DVD VD9.4, which differed from the entry in the original brandlist. This sample had a built in DVD player. Testing on this sample was restricted to the television component. The original brand list specified this code as model number: 22LCD/MPEG4. The brand list given in **Appendix II** has been amended accordingly.

### 3. Inventory

The inventory was restricted to detailing the basic brand identifications and logging the various features and settings that would have a bearing on energy consumption. The results for the inventory are given in the Excel table.

#### 3.1 Relevant Features and Settings

##### Tuner Types

The built in tuner types were recorded [row 5]. Only two samples (codes DAF1 and DAO1) had just an analogue tuner.

##### Screen Resolution

The regulation criterion includes an allowance for televisions with High-Definition (HD) capability. Thirteen of the codes tested had liquid crystal display (LCD) technology, HD display panels with a screen resolution of 1920 x 1080 pixels [row 6].

##### Backlight Technology

The method used for producing the screen backlight was noted. Five codes used light emitting diode (LED) backlights while all others used cold cathode fluorescent (CCFL) backlights [row 7]. Backlights using LED technology consumed significantly less than CCFL backlights, for televisions of the same screen area at the brightest available picture preset

##### Screen Size

The regulation criterion for televisions in on-mode is dependant on the visible screen area. The visible height and width of the television display panels were measured in cm on each sample [rows 32-33], and the area calculated in dm<sup>2</sup> [row 39]. The claimed diagonal screen size in inches was also noted [row 31].

##### Picture Mode

The default picture mode in the 'as delivered' settings and the picture mode that delivered the maximum luminance were recorded for each television [rows 8-9].

##### Automatic Brightness Control (ABC)

This feature [rows 10-11], when enabled resulted in an adjustment of the backlight of the televisions in response to the ambient lighting conditions. Brighter ambient light would result in a brighter backlight, but in lower ambient light this would result in a dimmer backlight and lower power consumption in on-mode. Nine samples had this feature, but four of these were not enabled by default.

##### On/Off (Hard-Off) Switch

In line with recent trends, some of the front panel off-modes, where provided, were fully off (hard off) where the consumption dropped to virtually zero (< 0.01 watt). Others were 'soft off' and either reduced the power consumption slightly or there was virtually no difference. Use of this setting meant the TV could not be switched on using the remote control. On some codes this off-mode consumption was virtually no lower than the 'standby' consumption which seems to make it a pointless option. Some televisions did not have an 'Off' mode of either type (hard or soft), while some sets had standby levels that were so low it seems to mitigate the need for an 'off' mode.

The EC Regulation criterion includes an extra allowance for power consumption in standby-mode for televisions with an 'easily visible' off switch achieving less than 0.01 watt when operated. Six samples had switches, which all achieved 0.01 watt [row 12]. All were easily accessible [row 13], but some were not easily visible. Code DAA1 had a switch at the top, facing backwards that was poorly labelled. The three LG samples (codes DAD1, DAR1 and DAT1) had switches at the bottom, either facing backwards or downwards. They did have a non-permanent, removable label on the front indicating this, but the font used was small and difficult to read.

### **Home or Store Option**

In general (see section 2. **Sample Condition** above), when operating the samples for the first time, the tester was presented with an initialisation sequence, where options were available to select. These options relate to regional settings and user preferences.

Many codes offer the choice of 'Home' or 'Store' during the initial installation [row 14]. The 'Store' setting is intended for retailers to use for display purposes. The EC regulation requires that 'Home' should be highlighted as the default option from 20 August 2010. Codes DAA1 (Dantax) and DAF1 (Toshiba) did not have this option, but all other codes with the option offered 'Home' as the default setting. Codes DAE1 and DAS1 (both Philips) had been previously used, so could not be tested for this default setting.

The EC regulation also requires that if 'Home Mode' is not selected, there should be a further selection process to confirm this choice, however this test was not requested by the client.

### **Automatic Power-Down**

From 20 August 2011, televisions are required to have an automatic power-down feature which operates within four hours of the last user intervention or channel change. This feature must be enabled by default and an on-screen alert must be displayed prior to automatically powering down. Five samples (codes DAH1, DAJ1, DAK1, DAM1 and DAU1) had this feature [row 15], but code DAJ1 (Sharp) did not have it enabled by default.

## 4. Power Consumption Measurements

The EC Regulation 642/2009 for Televisions specifies maximum power consumption levels in on-mode, standby and off-mode. In the absence of a specific harmonised standard relating to all power modes for this regulation, the power consumption in standby and off-mode is measured to the EN 62301:2005 standard and the on-mode to the IEC 62087: 2008 standard.

For this project all power consumption measurements were completed under controlled conditions. Throughout the testing procedure the lighting conditions, ambient temperature and voltage of the mains supply were monitored and controlled where necessary. The temperature varied between 19.8°C and 24.8°C while the %VTHD of the mains supply remained less than 0.1% to comply with IEC 62087: 2008.

Air flow in the vicinity of the test samples was measured at less than 0.1m/s.

The test voltage was 230V±1% at 50Hz ±1%.

### Regulation 642/2009 Criteria Referenced

The results for the power measurements are given in the Excel table. The minimum regulatory criteria of EC Regulation 642/2009 for Televisions has been referenced with significant dates given in **Appendix III**. In addition, criteria referenced in ANNEX III, VERIFICATION PROCEDURE is also referenced where the minimum performance has not been met. This allows 0.10 watt more power consumption in off-mode and standby-mode than the original criteria. It also allows for 7% more power consumption in on-mode than the original criteria and a minimum default luminance of 60% of the brightest luminance available on a television. The original default luminance criteria is 65% of the brightest luminance available on a television. The comments column in the Excel table indicates which criteria is referenced.

### 4.1 Sample Preparation

On each sample, any initial setup routine required was followed. If choices were required, all the defaults were selected (apart from regional settings). Mostly this involved repeatedly selecting "Next" or pressing "OK". If there was a choice between 'Home mode' and 'Shop mode', 'Home mode' was selected, as this was the required mode for the on-mode testing.

All the sample televisions completed at least ten hours of 'running in' before any formal testing began. Although not required according to the standard it is considered good practise as it allows brand new televisions to stabilise their operation characteristics. Before any measurements were taken the sample television under test had been turned on, displaying IEC 62078: 2008 Broadcast test content for a minimum of one hour to ensure the electronics had stabilised.

A diagram of the test equipment set-up has been given in **Appendix IV**.

## 4.2 Measurements

Mains power consumption was measured under a variety of conditions [rows 19, 20 & 27].

The **'on-mode' power** consumption was measured using the method described in standard IEC 62087: 2008 for the "On (average) mode". This is carried out by displaying the IEC 62078: 2008 Broadcast test content, 10 minute video sequence designed for flat panel TVs, with the picture settings 'as delivered'. The test material was fed to the sample televisions via their HDMI inputs, as agreed with the client prior to testing. A 'benchmark' Sony Blu-ray player was used (Model: BDP-S560) and where possible the HDMI output resolution was set to 1080p. On three samples (codes DAA1, DAF1 and DAU1) the resolution was set to 1080i as they did not support the higher resolution. All the samples had an aerial connected and had previously been tuned in to ensure, as much as possible, that the internal tuner was active.

All codes were found to be within the manufacturers' on-mode power consumption claims.

All of the codes pass the minimum on-mode power consumption requirements up to 20 August 2011 [row 73]. Three samples (codes DAE1, DAG1 and DAO1) fail the on-mode requirements as of 1 April 2012 [row 86], but codes DAE1 and DAG1 pass if given the extra 7% allowance for verification testing [row 87].

The televisions that had Automatic Brightness Controls enabled 'as delivered' (codes DAE1, DAG1, DAH1, DAM1 and DAS1) were measured with the feature disabled, in line with the requirements of the EC Regulation. The measured results for 'on-mode' using 'as delivered' settings varied between 38.5 watts and 193 watts [row 19].

**Peak luminance ratio** In line with the EC Regulation for ecodesign requirements for televisions 642/2009 and at the request of the client, each of the sample codes was tested to find their respective 'as delivered' peak luminance to maximum available peak luminance ratio. This involved selecting the televisions brightest preset mode (for example, Vivid, Dynamic or Bright) and comparing this luminance with the peak luminance using the 'as delivered' settings. Measurements were made with a Minolta CA-210 Display Colour Analyser. Where possible, two readings were taken, one as soon as the white pattern appeared on screen and the second, 30 seconds later [rows 21-24]. The characteristics of the dynamic backlight on some televisions meant an instantaneous reading was not possible, as the light output climbed steadily over a few seconds. For these televisions (codes DAF1, DAO1 and DAS1) there are no entries in rows 21 and 23. The resulting ratios (calculated as %) are entered in the Peak Luminance Ratio rows [rows 25-26]. The six televisions that fell below the minimum required 65% ratio level [row 62] (codes DAA1, DAH1, DAJ1, DAK1, DAM1 and DAU1) were adjusted to approx 65% luminance ratio, and then their 'on-mode' power was re-measured [row 27]. It was noted that two of these sets (codes DAJ1 and DAM1) did meet the minimum 60% luminance required for verification testing [row 63].

It was noted that all three Sony televisions (DAH1, DAK1 and DAU1) failed the 65% luminance ratio requirement. This was due to an initial set up choice that is unique to Sony. After the initial tuning had been completed an 'Eco mode' question appeared on screen giving the user a choice of selecting Eco mode 'On' (highlighted by default) or Eco mode 'Off'. Eco mode 'On' was used for the on-mode power testing. This mode switched the Power Save feature to 'Reduced', turned on the Automatic Brightness Control (where present) and activated the Auto Power-Down (after 3 hours) feature. The Power Save setting 'Reduced' resulted in a reduction of the backlight, saving

power but reducing light output. Therefore the sets failed to comply with the 65% luminance ratio requirement, with results comfortably short of the required target. When retested with the light output set to approximately 65% of the max level, the power used was noticeably higher, but within the on-mode power consumption limits set by the EC Regulation [rows 91-94].

**Standby-mode' power** consumption was measured. The measurements were made with the samples in the default settings after pressing the standby button on the remote control [row 28]. All codes were found to be within the manufacturers' standby-mode power consumption claims, where claims were made.

The default standby-mode must be at or below 1.00 watt to meet the EC Regulation from 7 January 2010. All the televisions met this requirement, with the majority being less than 0.5 watt. Note that some codes did not drop to low standby conditions immediately after they were switched to this mode, some took several minutes. Two of the samples (codes DAM1 and DAQ1) took longer than 15 minutes to switch to low standby power. These sets took between 16 and 22 minutes to switch to their low standby power levels. The two sets were each tested three times and the results were quite spurious between those quoted times.

Five of the codes fail the standby-mode requirement of 0.50 watt from 20 August 2011, but four of these (codes DAA1, DAB1, DAC1 and DAD1) pass if allowed the extra 0.10 watt allowance for verification testing.

Three Samsung televisions (codes DAI1, DAL1 and DAP1) come with the standby light 'Off' by default, resulting in a very low standby power, with the menu option of activating the fairly bright standby light if it is required.

One Sony television (code DAH1) had a 'Quick Start - On' standby-mode, although this was not the default standby-mode. The standby power was significantly higher if this mode was selected, but there were some 'on screen' warnings about the increased power use.

**'Off-mode' power** modes were measured [rows 29-30]. All codes were found to be within the manufacturers' off-mode power consumption claims, where claims were made.

The EC Regulation from 7 January requires that off-mode power consumption must be at or below 1.00 watt. All the televisions met this requirement, with the majority being less than 0.2 watt. This limit will be further reduced from 20 August 2011 to 0.30 watt or 0.50 watt for televisions with an 'easily visible' off switch which achieves no more than 0.01 watt when in the off position. Six of the samples (codes DAD1, DAJ1, DAM1, DAQ1, DAR1 and DAT1) had an off switch meeting the requirements of 0.01 watt or less. Only code DAA1 (Dantax) failed to meet the off-mode requirements, measuring 0.43 watt.

**Auto Power-Down** is the feature that switches the television to standby-mode if there is no user activity during a set period. This is a requirement of the EC Regulation from 20 August 2011. The sets were all tested to see if they had this feature activated by default. The televisions were left switched on and tuned in to a signal. The televisions were left switched on for at least 10 hours to see if they switched off automatically [row 15]. The few televisions that did switch off (codes DAH1, DAK1, DAM1 and DAU1) all gave the required 'on screen' warning prior to switching off. It was noted that the wording of the 'on screen' warning on the Toshiba (code DAM1) was grammatically incorrect as it said the television would 'switch to standby momentarily' whereas it meant the

television would switch to standby 'in a moment' or 'soon'. Code DAJ1 had the auto power-down feature but it was not enabled by default.

The **Energy Efficiency Index** [row 104] was calculated using the on-mode consumption measurements which were reduced by 5% if the conditions of ANNEX II of the DRAFT TV Labelling Directive were satisfied [row 103].

All samples were within Energy Efficiency classes A to D, with an almost even spread from A to C and one "D Class" sample [row 105].

The **annual on-mode energy consumption** [row 106] was calculated using the on-mode consumption measurements which were reduced by 5% if the conditions of ANNEX II of the DRAFT TV Labelling Directive were satisfied [row 103].

All samples had a calculated annual on-mode energy consumption of between 56.21kWh (code DAB1) and 281.78kWh (code DAO1).

## **Appendix I**

### **Test Programme**

## Specification of television measurements – DEST November 2009

The measurements shall be carried out according to the conditions in the Commission Regulation (EC) No 642/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for televisions (Annex II). The regulation does not specify the measurement standards to be used. Application of the standard IEC 62087:2008 (measurement of on-mode) and IEC 62301:2005 (measurement of standby and off-mode) will meet the conditions in the regulation.

Measurements of the on-mode shall be made using a dynamic broadcast-content video signal representing typical broadcast TV content. The measurement shall be the average power consumed over 10 consecutive minutes. The on-mode consumption shall be measured for a dynamic broadcast-content video signal of format 720p or for a video content signal of format 1080p (blue ray).

The following parameters should be measured

- On-mode power consumption (as delivered or in home-mode)
- Power in off-mode
- Power consumption in standby-mode(s)
- Screen size (in inches and dm)
- If the television has automatic power down: The time from the last user interaction to the automatic switch from on-mode to standby or off-mode.
- According to the directive the peak luminance of the on-mode condition of the television as delivered by the manufacturer shall not be less than 65 % of the peak luminance of the brightest on-mode condition provided by the television. It is important to include this aspect in the test. Therefore the following measurements have to be carried out:
  - Peak luminance of the on-mode condition of the television as delivered by the manufacturer (or in the home-mode in case of forced menu)
  - Peak luminance of the brightest on-mode condition provided by the television.
  - If the peak luminance of the on-mode condition of the television as delivered by the manufacturer (or in the home mode) is less than 65 % of the peak luminance of the brightest on-mode condition, the on-mode power consumption should also be measured in a condition in which the peak luminance of the on-mode condition is set to about 65 % of the peak luminance of the brightest on-mode condition.

### Furthermore the following information has to be recorded and reported

- Model name, number etc.
- Resolution (for instance 1920x1080)
- Automatic power down (yes/no)
- Easily visible off-switch (yes/no)
- Automatic brightness control (yes/no)
- Automatic power down (yes/no)
- Built-in tuner(s): Cable, terrestrial and/or satellite

## **Appendix II**

### **Brand List**

**Brand List**

<b>Code</b>	<b>Brand</b>	<b>Model number</b>	<b>Display</b>	<b>Backlight</b>	<b>Inches</b>
<b>DAA1</b>	Dantax	22LCD/DVD VD9.4	LCD	CCFL	22
<b>DAB1</b>	Samsung	LE22B546C4WXXE	LCD	CCFL	22
<b>DAC1</b>	Samsung	LS23EMDKU XE	LCD	CCFL	23
<b>DAD1</b>	LG	26LH2000-ZA	LCD	CCFL	26
<b>DAE1</b>	Philips	26PFL5604H/12	LCD	CCFL	26
<b>DAF1</b>	Toshiba	32AV605PG	LCD	CCFL	32
<b>DAG1</b>	Philips	32PFL3904H/12	LCD	CCFL	32
<b>DAH1</b>	Sony	KDL-32V5500	LCD	CCFL	32
<b>DAI1</b>	Samsung	UE32B7050WWXXE	LCD	LED	32
<b>DAJ1</b>	Sharp	LC-32LE700S	LCD	LED	32
<b>DAK1</b>	Sony	KDL-32P3550	LCD	CCFL	32
<b>DAL1</b>	Samsung	UE37B6050VWXXE	LCD	LED	37
<b>DAM1</b>	Toshiba	37RV685DN	LCD	CCFL	37
<b>DAN1</b>	Panasonic	TX-L37U10E	LCD	CCFL	37
<b>DAO1</b>	Thomson	40N90NH22N	LCD	CCFL	40
<b>DAP1</b>	Samsung	UE40B7070WWXXE	LCD	LED	40
<b>DAQ1</b>	Toshiba	42AV635DN	LCD	CCFL	42
<b>DAR1</b>	LG	42SL9000-ZA	LCD	LED	42
<b>DAS1</b>	Philips	42PFL7403H/10	LCD	CCFL	42
<b>DAT1</b>	LG	47LH3000-ZA	LCD	CCFL	47
<b>DAU1</b>	Sony	KDL-26S5500	LCD	CCFL	26

## **Appendix III**

### **EC Regulation 642/2009 for Televisions Significant Dates**

## EC Regulation 642/2009 Requirements

### Significant Dates

In order to satisfy the ErP minimum requirements for televisions:

#### From 7 Jan 2010

- All TVs must satisfy the off-mode criteria of  $\leq 1.00\text{W}$
- All TVs must satisfy the standby-mode criteria of  $\leq 1.00\text{W}$  or  $\leq 2.00\text{W}$  if they have an information or status display
- All TVs must have a standby-mode and/or an off-mode and/or another mode not exceeding the applicable requirements of standby/off-mode.

#### From 20 August 2010

- All TVs must satisfy the on-mode criteria of:
- Full HD TVs  $\leq 20$  (15 for TV monitors) +  $A^1 * (1.12 * 4.3224)\text{W}/\text{dm}^2$
- Other resolution TVs  $\leq 20$  (15 for TV monitors) +  $A * (4.3224)\text{W}/\text{dm}^2$
- If TVs have a forced menu, they must have a "Home Mode" as the default. If another mode is selected, there must be another selection process to confirm this choice
- All TVs must be delivered in a mode which is at least 65% of the peak luminance of the brightest on-mode condition provided by the TV.

#### From 20 August 2011

- All TVs must satisfy the off-mode criteria of  $\leq 0.3\text{W}$  or  $\leq 0.50\text{W}$  if there is an easily visible hard-off switch achieving  $\leq 0.01\text{W}$
- All TVs must satisfy the standby-mode criteria of  $\leq 0.50\text{W}$  or  $\leq 1.00\text{W}$  if they have an information or status display
- All TVs must have a standby-mode and/or an off-mode and/or another mode not exceeding the applicable requirements of standby/off-mode.
- All TVs must have an automatic switch from "on-mode" to "standby-mode" or "Off-mode" after a maximum of four hours following the last user interaction, with a warning prior to switching and this must be enabled by default.

#### From 1 April 2012

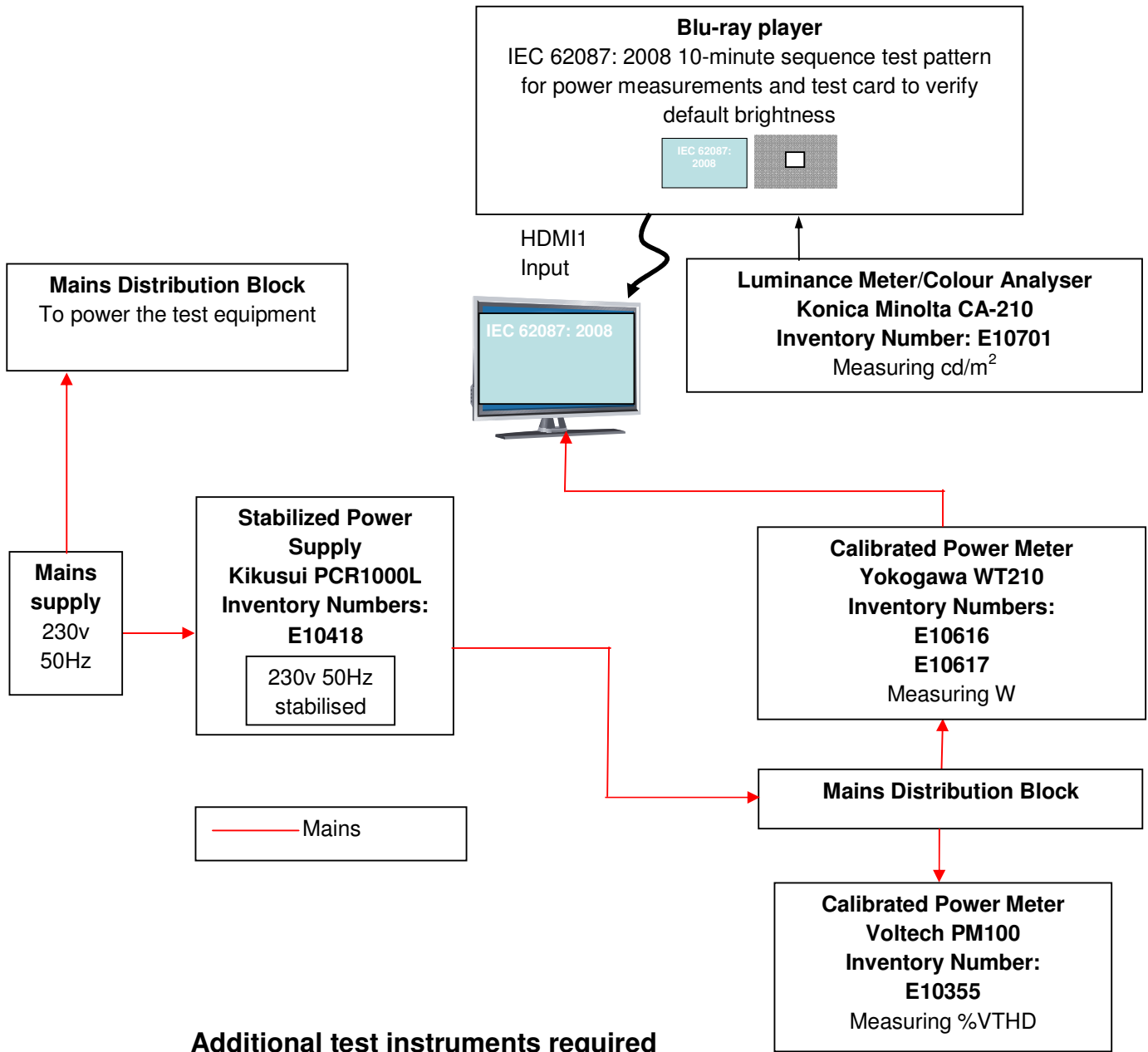
- All TVs regardless of resolution must satisfy the on-mode criteria of:  
 $\leq 16$  (12 for TV monitors) +  $A * (3.4579)\text{W}/\text{dm}^2$

---

<sup>1</sup> Where A = the screen area expressed in  $\text{dm}^2$

## **Appendix IV**

### **Test Equipment Set-up**



**Additional test instruments required**

Type	Make and model	Inventory Number	Measurement
Thermometer	RS 206-3744	E10403	°C
Airflow meter	Airflow TA5	E10317	m/s
Light Meter	Minolta XY-1	E10389	Lux