Task 8 SSL Annex Database update

Carsten Dam-Hansen

3 November 2021, zoom meeting

Overview

- Third term plan
- Database status
- Example of EU endurance data
- New photometric dataformat
- Plan for next 6 months
- Expert input and discussion

Third term plan

Task 8. SSL Annex Product Database

Task Leader: Carsten Dam-Hansen, Denmark

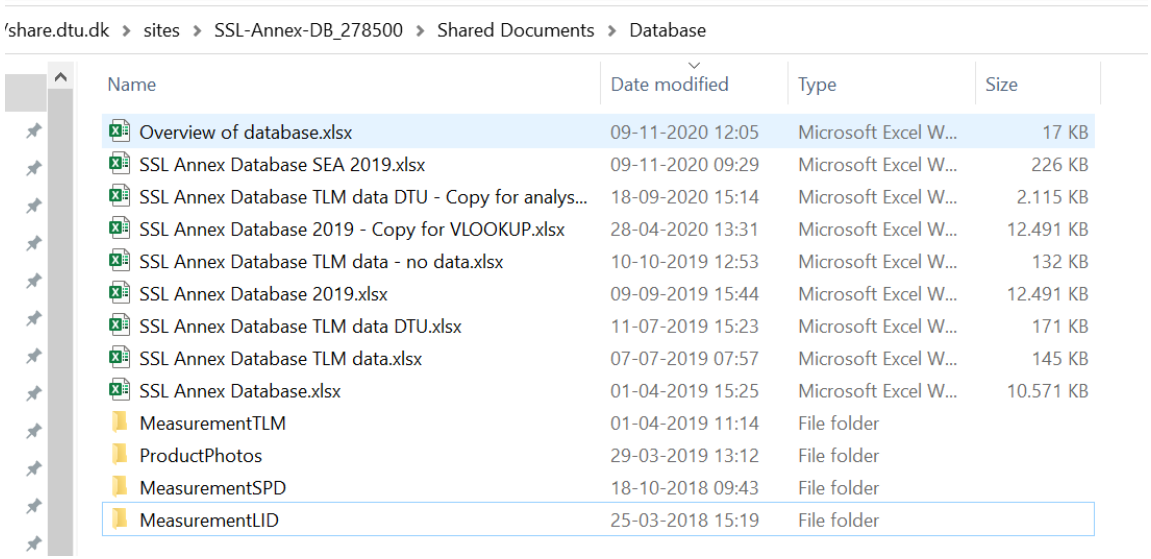
Objectives	To maintain and expand an internal benchmarking database of SSL products to enable member countries to share performance data and test results for LED lamps and LED luminaires and LED modules. This database would be used internally by SSL Annex member countries, but may also be used in public reports if it is presented as anonymous data (i.e., does not identify brands, models). The database will be populated with test data provided on a voluntary basis from member countries, and/or may also include other sources of data if deemed appropriate by the Task Leader.

FY1 (2019–20)				FY2 (2020–21)				FY3 (2021–22)				FY4 (2022–23)				FY5 (2023–24)			
MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF

- Making a common structure and storage for data and file sharing that is as useful for us to save and analyse data

Status

- Database structure done and documentation available. Database and analysis tools on a secure share site hosted by DTU: https://share.dtu.dk/sites/SSL-Annex-DB_278500/SitePages/Home.aspx
- Documents are stored in folders, and are versioned so that we keep track of older versions.



- Excel database files with identical structure allowing for analysis across the files (excel, power pivot, matlab)

Status Data

Data entered

- Lighting facts
- DLC
- Der LichtPeter TLM
- DTU TLM measurements, **Longterm testing, LM-84 and EU endurance**
- SEA data, 2019, SPD data

In process

- SEA 2020, **EU endurance**
- Australia (35 models, average of results) TLM, **EU endurance**

Longterm testing Data

Structure and data

- DTU Fotoniks own longterm testing data included (show excel)
- List of product IDs the artefacts and the test they have been subjected to

	C	D	Y	Z	AA	AB	AC
	labM#	labA#	long term switching	Long term ambient temperature	Long term ambient humidity	AccOperation time [h]	Voltage [V]
	M33185	L31894	EU endurance	21		0	230,000
	M33641	L31894	EU endurance	21		3000	229,980
	M33186	L31895	EU endurance	21		0	229,999
	M33642	L31895	EU endurance	21		3000	229,980
	M33024	L31866	LM-84 continuous	21		0	229,985
	M33272	L31866	LM-84 continuous	21		1000	229,991
	M33339	L31866	LM-84 continuous	21		2000	229,995
	M33444	L31866	LM-84 continuous	21		3000	229,996
	M33544	L31866	LM-84 continuous	21		4000	229,989
	M33600	L31866	LM-84 continuous	21		5000	230,012
	M33666	L31866	LM-84 continuous	21		6000	229,983
	M33025	L31867	LM-84 continuous	21		0	229.981

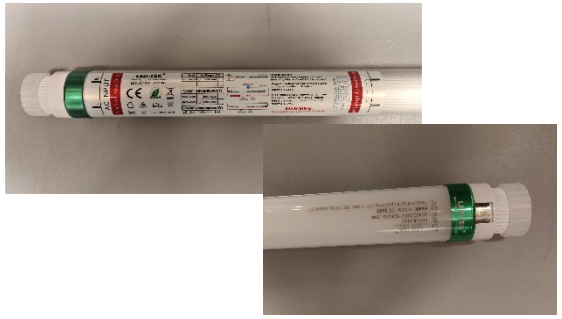
Row Labels	Count of Luminous flux [lm]	Max of AccOperation time [h]
P31546		
EU endurance		
L31886	2	3000
L31887	2	3000
L31888	2	3000
L31889	2	3000
L31890	2	3000
L31891	2	3000
L31892	2	3000
L31893	2	3000
L31894	2	3000
L31895	2	3000
LM-84 continuous		
L31896	6	5000
L31897	6	5000
L31898	6	5000
L31899	6	5000
P31547		
EU endurance		
L31855	2	3000
L31856	2	3000
L31857	2	3000
L31858	2	3000
L31859	2	3000
L31860	2	3000
L31861	2	3000
L31862	2	3000
L31863	2	3000
L31864	2	3000
L31865	2	3000
LM-84 continuous		
L31866	7	6000
L31867	7	6000
L31868	7	6000
L31869	7	6000
L31982	7	6000
P31548		
LM-84 continuous		
L31900	6	5000
P31549		
EU endurance		
L31901	2	3000
L31902	2	3000
L31903	1	0
L31904	2	3000
L31905	2	3000
L31906	2	3000
L31907	2	3000
L31908	2	3000
L31909	2	3000
L31910	2	3000
LM-84 continuous		
L31911	4	3000
L31912	4	3000
L31913	4	3000
L31914	4	3000
L31915	4	3000
Grand Total	146	6000

Longterm testing Data

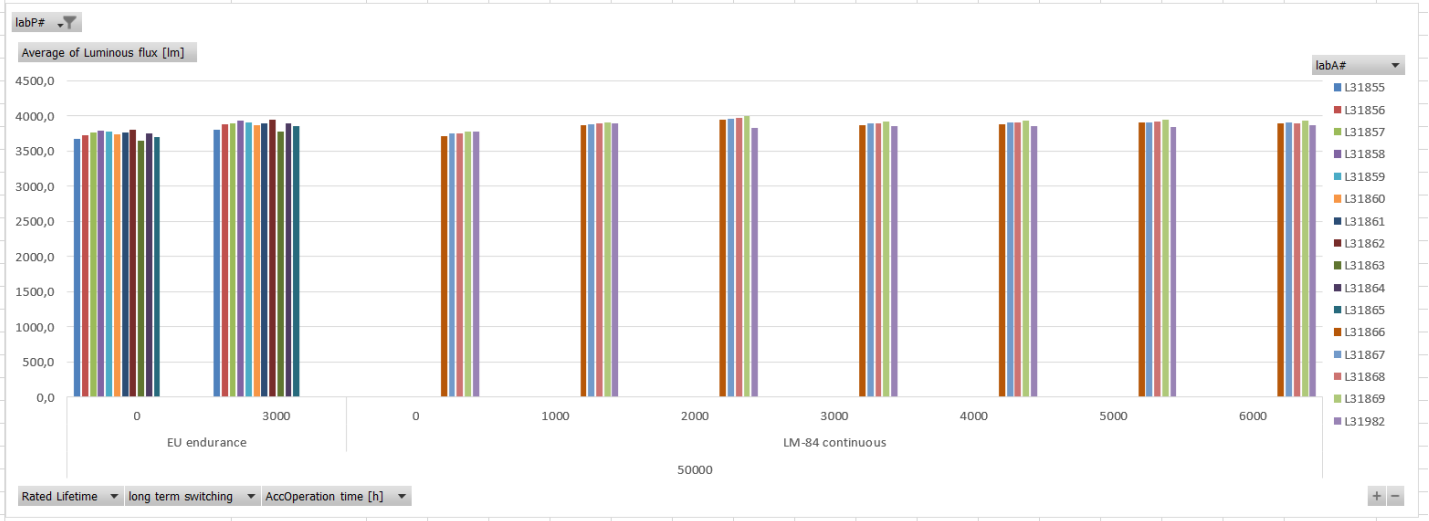
Luminous flux data

LED tube

- 11 samples EU test
- 5 samples LM-84



labP#	P31547																
Average of Luminous flux [lm]	**Column Labels**																
Row Labels	**L31855**	**L31856**	**L31857**	**L31858**	**L31859**	**L31860**	**L31861**	**L31862**	**L31863**	**L31864**	**L31865**	**L31866**	**L31867**	**L31868**	**L31869**	**L31982**	**Grand Total**
50000																	
EU endurance																	
0	3669,3	3730,4	3760,8	3794,3	3778,9	3745,6	3763,5	3810,6	3644,0	3756,1	3702,5						3741,5
3000	3809,6	3878,4	3890,2	3937,9	3909,6	3874,1	3896,2	3946,9	3775,5	3891,0	3850,4						3878,2
LM-84 continuous																	
0												3712,3	3746,3	3752,4	3784,2	3774,8	3754,0
1000												3872,4	3878,3	3895,1	3912,1	3896,3	3890,8
2000												3952,0	3963,0	3967,0	4000,1	3824,9	3941,4
3000												3869,3	3889,9	3894,7	3924,0	3852,9	3886,2
4000												3885,0	3903,7	3906,0	3938,3	3862,2	3899,0
5000												3902,3	3912,4	3918,1	3952,1	3845,8	3906,1
6000												3893,0	3904,3	3901,6	3939,3	3870,2	3901,7
Grand Total	**3739,5**	**3804,4**	**3825,5**	**3866,1**	**3844,2**	**3809,9**	**3829,8**	**3878,7**	**3709,7**	**3823,5**	**3776,5**	**3869,5**	**3885,4**	**3890,7**	**3921,5**	**3846,7**	**3854,6**

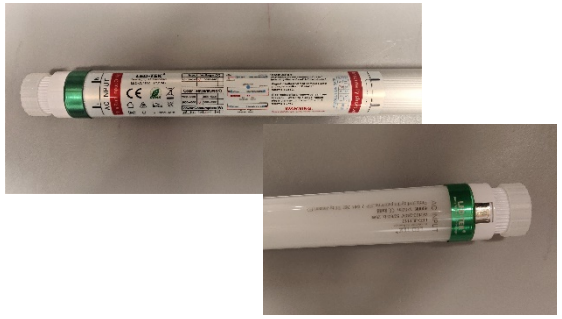


Longterm testing Data

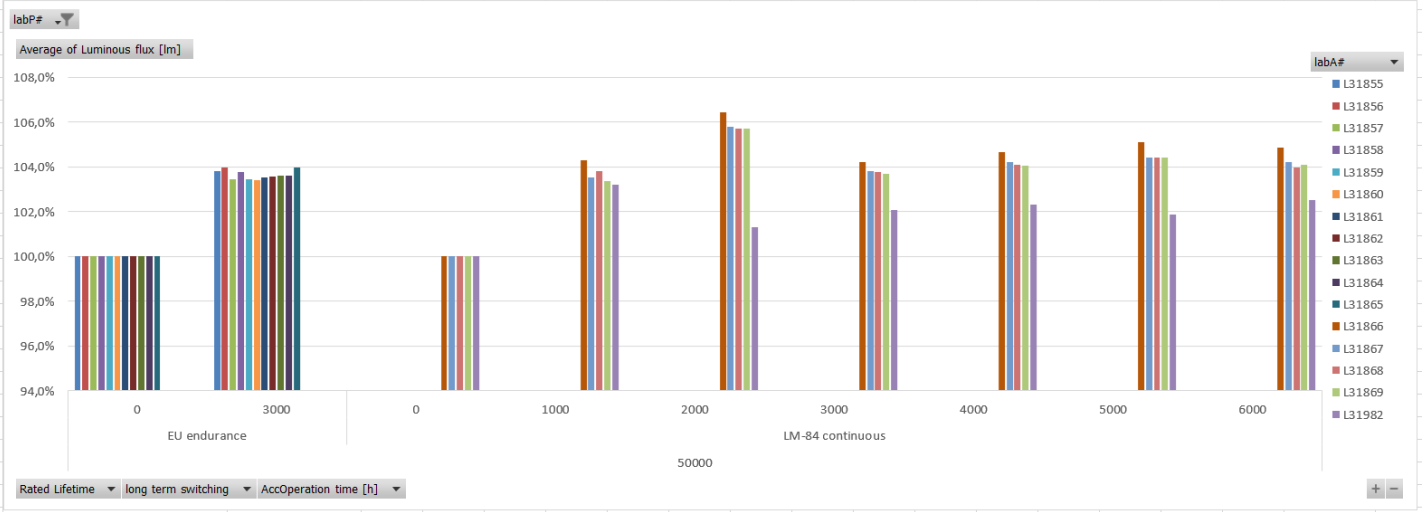
Relative Luminous flux data

LED tube

- 11 samples EU test
- 5 samples LM-84



labP#	P31547																
Average of Luminous flux [lm]	**Column Labels**																
Row Labels	**L31855**	**L31856**	**L31857**	**L31858**	**L31859**	**L31860**	**L31861**	**L31862**	**L31863**	**L31864**	**L31865**	**L31866**	**L31867**	**L31868**	**L31869**	**L31982**	**Grand Total**
50000																	
EU endurance																	
0	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%						100,0%
3000	103,8%	104,0%	103,4%	103,8%	103,5%	103,4%	103,5%	103,6%	103,6%	103,6%	104,0%	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	103,7%
LM-84 continuous																	
0												100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
1000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	104,3%	103,5%	103,8%	103,4%	103,2%	103,6%
2000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	106,5%	105,8%	105,7%	105,7%	101,3%	105,0%
3000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	104,2%	103,8%	103,8%	103,7%	102,1%	103,5%
4000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	104,7%	104,2%	104,1%	104,1%	102,3%	103,9%
5000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	105,1%	104,4%	104,4%	104,4%	101,9%	104,1%
6000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	104,9%	104,2%	104,0%	104,1%	102,5%	103,9%
Grand Total																	



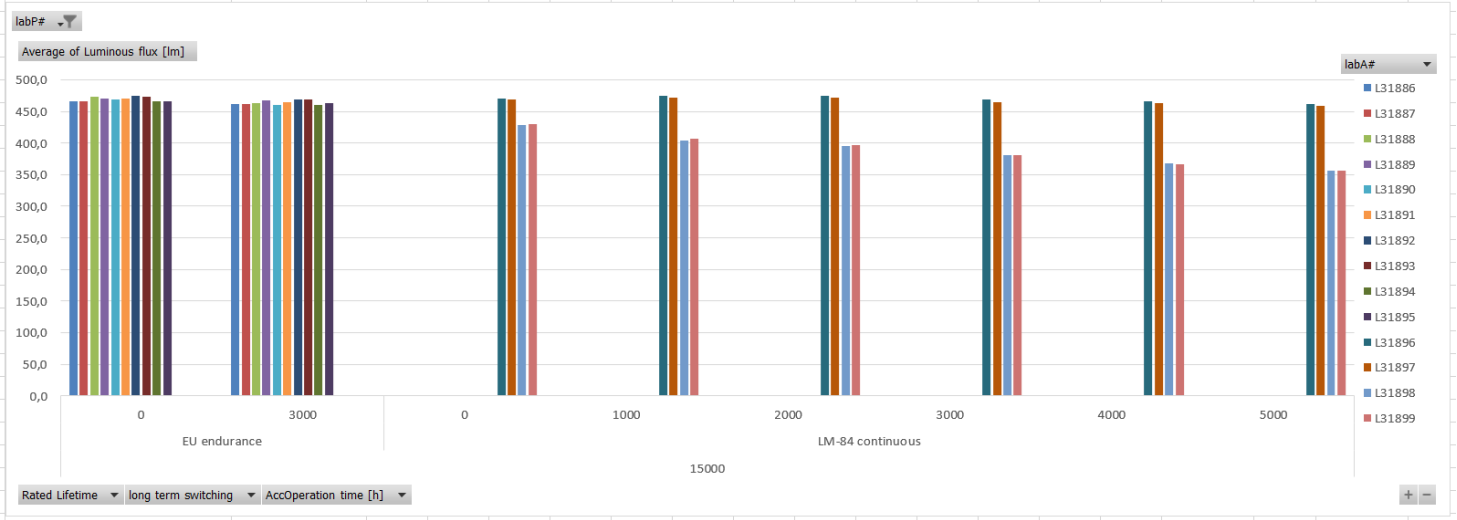
XLMFmin	97,9%	96,0%

Longterm testing Data

Luminous flux data

- LED spot lamp
- 11 samples EU test
- 5 samples LM-84

labP#	P31546														
Average of Luminous flux [lm]	Column Labels														
Row Labels	L31886	L31887	L31888	L31889	L31890	L31891	L31892	L31893	L31894	L31895	L31896	L31897	L31898	L31899	Grand Total
15000															
EU endurance															
0	465,6	466,2	472,7	470,2	468,7	470,4	475,2	472,7	465,8	465,6					469,3
3000	461,8	461,1	463,7	467,2	460,5	465,1	468,3	469,1	460,9	463,6					464,1
LM-84 continuous															
0											470,5	468,8	428,8	430,0	449,5
1000											474,0	472,5	404,5	406,2	439,3
2000											474,0	471,5	395,9	396,6	434,5
3000											468,9	465,3	381,1	380,4	423,9
4000											466,7	463,1	367,6	367,1	416,1
5000											461,9	458,8	356,3	355,7	408,2
Grand Total	463,7	463,7	468,2	468,7	464,6	467,7	471,8	470,9	463,4	464,6	469,3	466,7	389,0	389,3	445,9

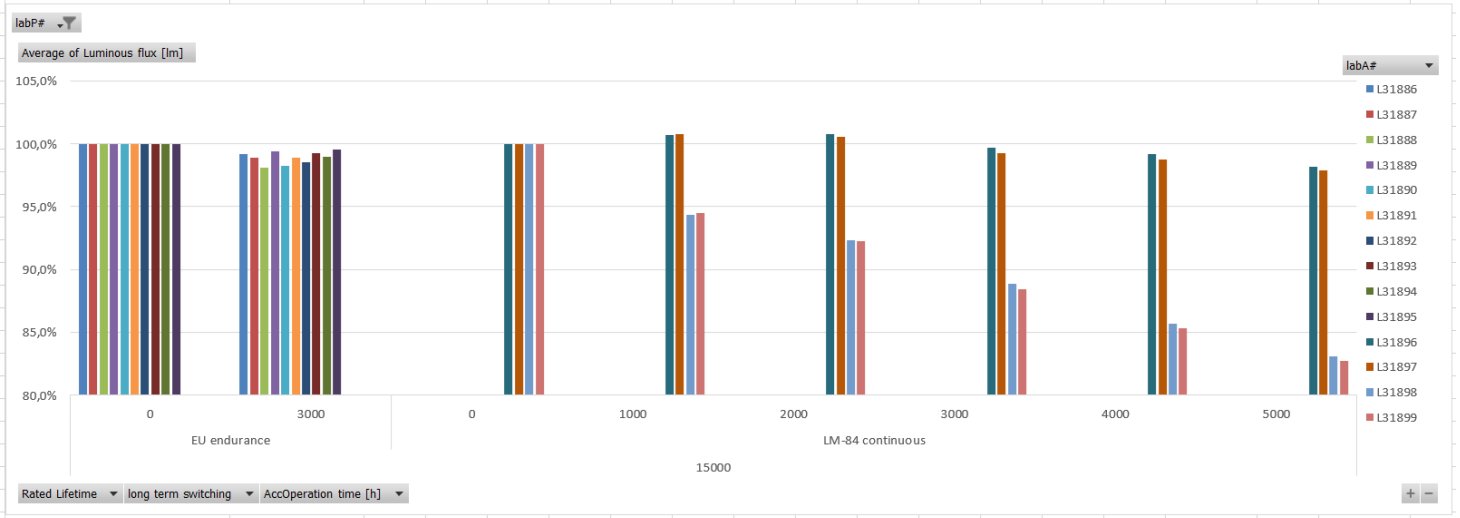


Longterm testing Data

Relative Luminous flux data

- LED spot lamp
- 11 samples EU test
- 5 samples LM-84

labP#	P31546														
Average of Luminous flux [lm]	**Column Labels**														
Row Labels	**L31886**	**L31887**	**L31888**	**L31889**	**L31890**	**L31891**	**L31892**	**L31893**	**L31894**	**L31895**	**L31896**	**L31897**	**L31898**	**L31899**	**Grand Total**
15000															
EU endurance															
0	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%					100,0%
3000	99,2%	98,9%	98,1%	99,4%	98,2%	98,9%	98,5%	99,2%	99,0%	99,6%	#NULL!	#NULL!	#NULL!	#NULL!	98,9%
LM-84 continuous															
0											100,0%	100,0%	100,0%	100,0%	100,0%
1000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	100,7%	100,8%	94,3%	94,5%	97,7%
2000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	100,7%	100,6%	92,3%	92,2%	96,7%
3000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	99,7%	99,2%	88,9%	88,5%	94,3%
4000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	99,2%	98,8%	85,7%	85,4%	92,6%
5000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	98,2%	97,9%	83,1%	82,7%	90,8%
Grand Total															



XLMFmin	93,1%	93,1%	

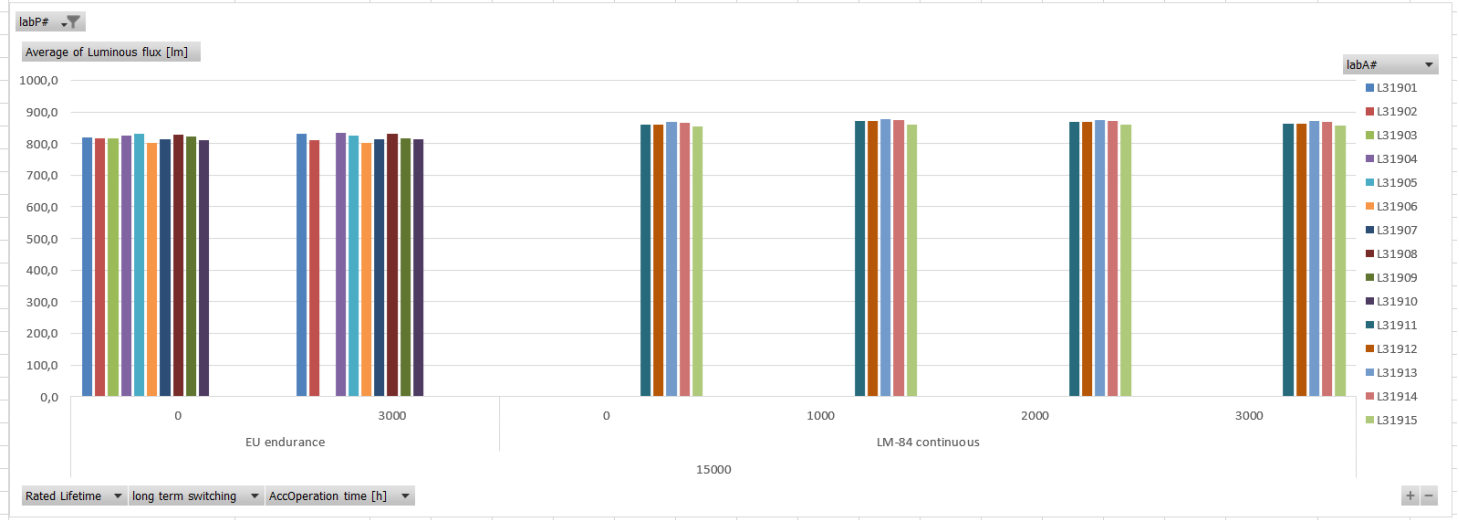
Longterm testing Data

Luminous flux data

- LED lamp
- 11 samples EU test
- 5 samples LM-84

1/10 did not survive

labP#	P31549															
Average of Luminous flux [lm]	Column Labels															
Row Labels	L31901	L31902	L31903	L31904	L31905	L31906	L31907	L31908	L31909	L31910	L31911	L31912	L31913	L31914	L31915	Grand Total
15000																
EU endurance																
0	819,9	815,9	815,6	825,3	829,7	800,8	814,3	828,4	821,6	810,9						818,2
3000	830,7	810,7		834,6	826,4	802,5	813,5	831,6	817,9	813,0						820,1
LM-84 continuous																
0											860,8	860,2	867,5	865,7	853,0	861,4
1000											870,5	870,4	875,7	874,2	860,4	870,2
2000											868,3	868,1	875,6	872,3	861,0	869,1
3000											863,9	862,8	871,5	867,9	856,8	864,6
Grand Total	**825,3**	**813,3**	**815,6**	**829,9**	**828,0**	**801,6**	**813,9**	**830,0**	**819,7**	**812,0**	**865,9**	**865,4**	**872,6**	**870,0**	**857,8**	**843,3**



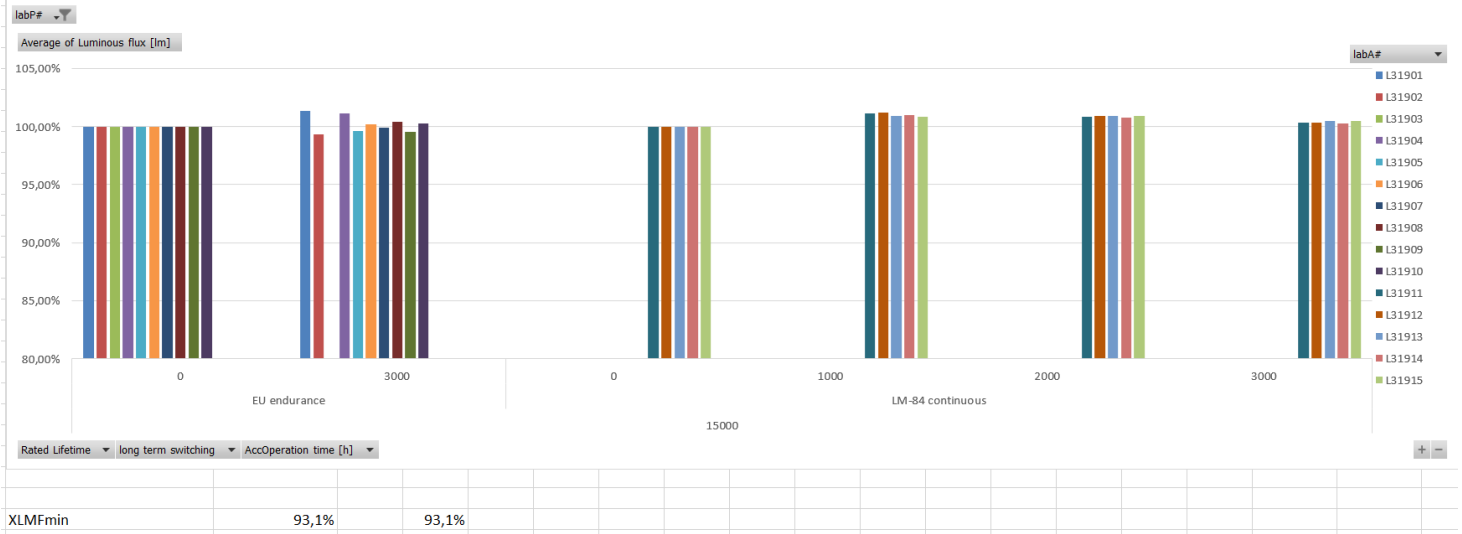
Longterm testing Data

Relative Luminous flux data

- LED lamp
- 11 samples EU test
- 5 samples LM-84

1/10 did not survive

labP#	P31549															
Average of Luminous flux [lm]	Column Labels															
Row Labels	L31901	L31902	L31903	L31904	L31905	L31906	L31907	L31908	L31909	L31910	L31911	L31912	L31913	L31914	L31915	Grand Total
15000																
EU endurance																
0	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%						100,00%
3000	101,32%	99,36%	#NULL!	101,13%	99,60%	100,22%	99,90%	100,38%	99,56%	100,26%	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	100,23%
LM-84 continuous																
0											100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
1000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	101,13%	101,19%	100,95%	100,97%	100,87%	101,02%
2000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	100,87%	100,92%	100,93%	100,76%	100,94%	100,89%
3000	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	#NULL!	100,36%	100,31%	100,46%	100,25%	100,45%	100,36%
Grand Total																



XLMFmin	93,1%	93,1%

Longterm testing Data

Overview

- EU endurance test results

long term switching	EU endurance								
Row Labels	**Count of Luminous flux [lm]**	**Average of Luminous flux [lm]**	**StdDev of Luminous flux [lm]**	**Average of Luminous flux [lm]2**	**Rel. StdDev Lum**	**XLMF**	**XLMFmin**	**Pass/Fail**	**# of Faliures**
P31546									
15000						93,11%	93,11%		
0	10	469,3	3,5	100,00%	0,7%				
3000	10	464,1	3,2	98,90%	0,7%		98,90%	Pass	0
P31547									
50000						97,88%	96,00%		
0	11	3741,5	51,4	100,00%	1,4%				
3000	11	3878,2	50,9	103,65%	1,3%		103,65%	Pass	0
P31549									
15000						93,11%	93,11%		
0	10	818,2	8,7	100,00%	1,1%				
3000	9	820,1	11,1	100,23%	1,4%		100,23%	Pass	1

Longterm testing Data

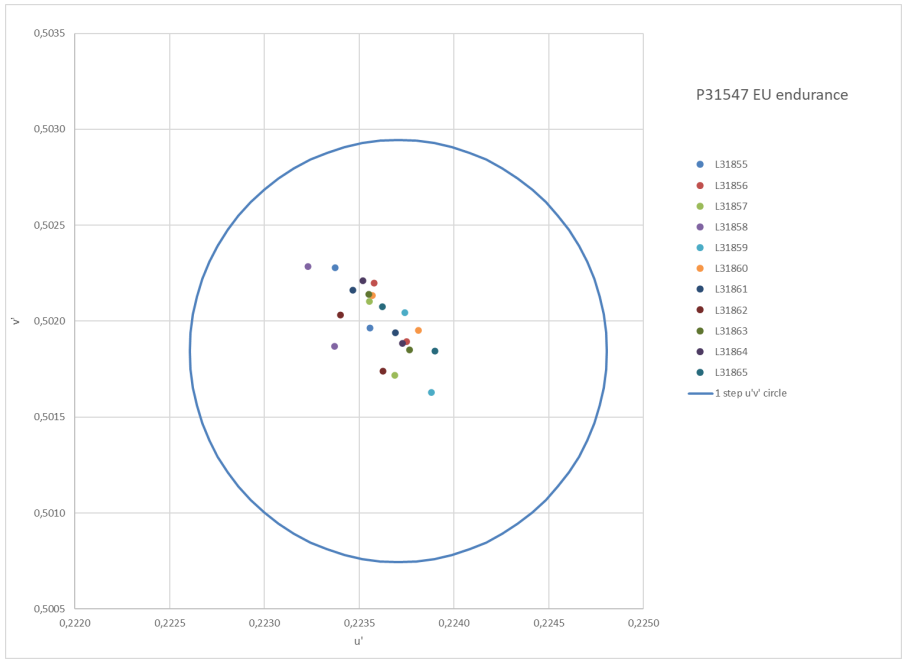
Color data

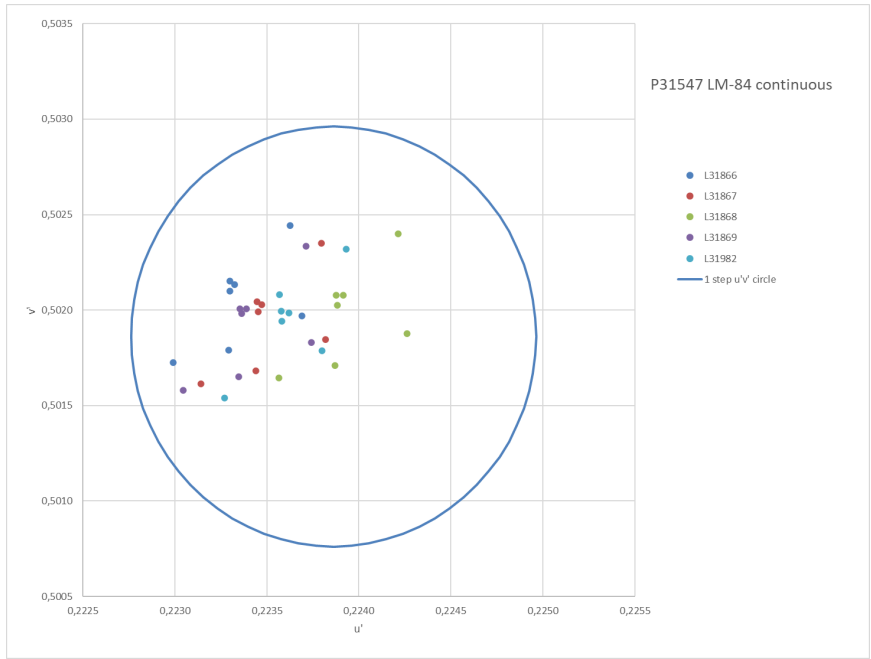
- (u',v') chromaticity

LED tube
11 samples EU test
5 samples LM-84

labP# P31547

Row Labels	L31855		L31856		L31857		L31858		L31859		L31860		L31861		L31862		L31863		L31864		L31865		L31866		L31867		L31868		L31869		L31982		Total Aver	Total Avera
	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average o	Average of v1976	
EU endurance																																		
0	0,2236	0,5020	0,2238	0,5019	0,2237	0,5017	0,2234	0,5019	0,2239	0,5016	0,2238	0,5020	0,2237	0,5019	0,2236	0,5017	0,2238	0,5019	0,2237	0,5019	0,2239	0,5018											0,2237	0,5018
3000	0,2234	0,5023	0,2236	0,5022	0,2236	0,5021	0,2232	0,5023	0,2237	0,5020	0,2236	0,5021	0,2235	0,5022	0,2234	0,5020	0,2236	0,5021	0,2235	0,5022	0,2236	0,5021											0,2235	0,5022
LM-84 continuous																																		
0																							0,2237	0,5020	0,2238	0,5018	0,2243	0,5019	0,2237	0,5018	0,2238	0,5018	0,2239	0,5019
1000																							0,2233	0,5018	0,2234	0,5017	0,2239	0,5017	0,2233	0,5017	0,2233	0,5015	0,2234	0,5017
2000																							0,2230	0,5017	0,2231	0,5016	0,2236	0,5016	0,2230	0,5016	0,2236	0,5019	0,2233	0,5017
3000																							0,2233	0,5021	0,2235	0,5020	0,2239	0,5020	0,2234	0,5020	0,2236	0,5020	0,2235	0,5020
4000																							0,2233	0,5021	0,2235	0,5020	0,2239	0,5021	0,2234	0,5020	0,2236	0,5020	0,2235	0,5020
5000																							0,2233	0,5022	0,2234	0,5020	0,2239	0,5021	0,2234	0,5020	0,2239	0,5023	0,2236	0,5021
6000																							0,2236	0,5024	0,2238	0,5024	0,2242	0,5024	0,2237	0,5023	0,2236	0,5021	0,2238	0,5023





New photometric dataformat

Data for luminaires

- generic and expandable replacement for IES LM-63 (.ies), EULUMDAT (.ldt); LID, power, luminous flux, CCT, CRI
- IES TM-33-18 new structure based on xml

```
<?xml version="1.0" encoding="UTF-8"?>
  <Root xsi:noNamespaceSchemaLocation="GldfSchema.
    <Header />
    <GeneralDefinitions>
      <Files />
      <Sensors />
      <Photometries />
      <Spectrums />
      <LightSources />
      <ControlGears />
      <Equipments />
      <Geometries />
    </GeneralDefinitions>
    <ProductDefinitions>
      <ProductMetaData />
      <Variants>
        <Variant />
        <Variant />
      </Variants>
    </ProductDefinitions>
  </Root>
```

Table 10. Light Source Fields

Element Description	Element Name
Quantity	Quantity
Description	Description
Catalog Number	CatalogNumber
Rated Lumens	RatedLumens
Input Wattage	InputWattage
Power Factor	PowerFactor
Ballast Factor	BallastFactor
Tilt Angles	TiltAngles
Correlated Color Temperature (CCT)	ColorTemperature
Color Rendering	ColorRendering
Duv	Duv
S/P Ratio	SPRatio
Data Generation	DataGeneration
Luminous Data	LuminousData
Radiant Data	RadiantData
Photon Data	PhotonData
Spectral Data	SpectralData
Illuminance Data	IllumData
Irradiance Data	IrradData
Photon Flux Density Data	PFDData
Spectral Irradiance Data	SpecIrradData
Channels	Channels
Emission Areas	EmissionAreas
Emitter Center	EmitterCenter
Regulatory	Regulatory

- Relux and Dialux; Global Lighting Data Format, https://gldf.io/, uniform and comprehensive data format for the lighting industry
- DLC LUNA , requires TM-33-18 .xml document for LID, SPD
- Action: follow this development to see if this is useful for task 8
- New Danish project on this and collaboration with GLDF

Plan and Round the table

Plan for next period:

- Import SEA data for EU endurance testing (coll. with Christofer)
- Import SEA data + TLM for all years available (coll. with Christofer)
- Import Australian data (coll. with Steve/Gillian)
- Find new storage for the data (sharepoint and excel not a good solution as it grows)
- Follow the development of new photometric data format (xml)
- Make analysis and short report on longterm testing, EU endurance
- Make analysis and short report on PstLM and SVM