



Summary

Street luminaries are often only tested at 100% setting, but when they are installed, they are often dimmed to lower light output. Dimming has been linked to increased risk of problematic temporal light modulation as well as deceased efficiency.

Measurements will be done on five different street lighting luminaires, they will be tested at different dimming settings, 100, 50 and 25% and their different figures of merit will calculated.

The results for the measurements shows that the is no noticeable flicker on the five luminaires measured.

Laboratory Operation conditions Seasoning DOLL Quality Lab Tested at 230 VAC, at different dimming levels NONE

Test Laboratory

DOLL Quality Lab- DTU Electro Risø campus, Building 128 Frederiksborgvej 399, 4000 Roskilde

The test has been performed by:

Dennis Corell, Research Engineer

And supervised by:

Damrson

Carsten Dam-Hansen, Senior Scientist





Summary of results

The main results from the five tested luminaires will be presented in this section.

L32224	Anonymous						
Intensity *)	Power [W]	PF [-]	Flicker Index [-]	Modulation Depth [%]	SVM [-]	PstLM [-]	
100 %	66.2	0.96	0.01	5.6	0.134	0.017	
50 %	29.7	0.87	0.01	7.7	0.125	0.48	
25 %	16.6	0.73	0.01			0.40	
L32229	Anonymous						
Intensity *)	Power [W]	PF [-]	Flicker Index [-]			PstLM [-]	
100 %	48.1	0.98	0.0	0.4	0.003	0.0032	
50 %	24.8	0.95	0.0	0.8	0.0092	0.0060	
25 %	12.6	0.82	0.0038	2.24	0.0279	0.0154	
L322264	Anonymous		-				
Intensity *)	Power [W]	PF [-]	Flicker Index [-]	Modulation Depth [%]	SVM [-]	PstLM [-]	
100 %	43.9	0.96	0.0067	2.6	0.0837	0.0963	
50 %	21.7	0.87	0.0052	2.2	0.0621	0.1437	
25 %	10.4	0.59	0.0043	2.5	0.0484	0.1882	
L32265	Anonymous		-				
Intensity *)	Power [W]	PF [-]	Flicker Index [-]	Modulation Depth [%]	SVM [-]	PstLM [-]	
100 %	115	0.99	0.0022	1.3	0.0257	0.0604	
50 %	58.4	0.97	0.0019	2.5	0.0136	0.0925	
25 %	29.5	0.88	0.0068	4.33	0.0820	0.1860	
L32266	Anonymous						
Intensity *)	Power [W]	PF [-]	Flicker Index [-]	Modulation SVM [-] Depth [%]		PstLM [-]	
100 %	66.8	0.99	0.0	0.3	0.0045	0.0058	
50 %	33.7	0.97	0.0	0.7	0.0094	0.0411	
25 %	16.4	0.88	0.001	1.9 0.005		0.0086	

*) note: The intensity setting have been adjusted to the power.

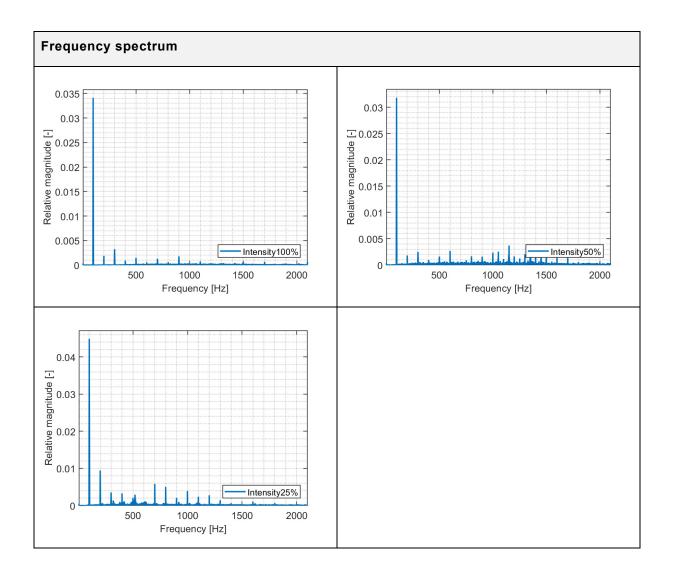




Results Device ID L32224 Temporal light modulation results / flicker Intensity *) Power [W] PF [-] Flicker Modulation SVM [-] PstLM [-] Index [-] Depth [%] 0.96 100 % 66.2 0.01 5.6 0.134 0.017 50 % 29.7 0.87 0.01 7.7 0.125 0.48 25 % 16.6 0.73 0.01 9.3 0.176 0.40 Waveform Waveform of light intensity Waveform of light intensity 1 1 0.8 0.8 Intensity (a.u.) 60 90 Intensity (a.u.) .0 .5 .0 0.2 0.2 Intensity100% Intensity50% 0 0 0 20 40 60 80 0 20 40 60 80 100 Time (ms) Time (ms) Waveform of light intensity 1 0.8 Intensity (a.u.) 9.0 9.0 0.2 Intensity25% 0 ^v 20 60 100 40 80 Time (ms)







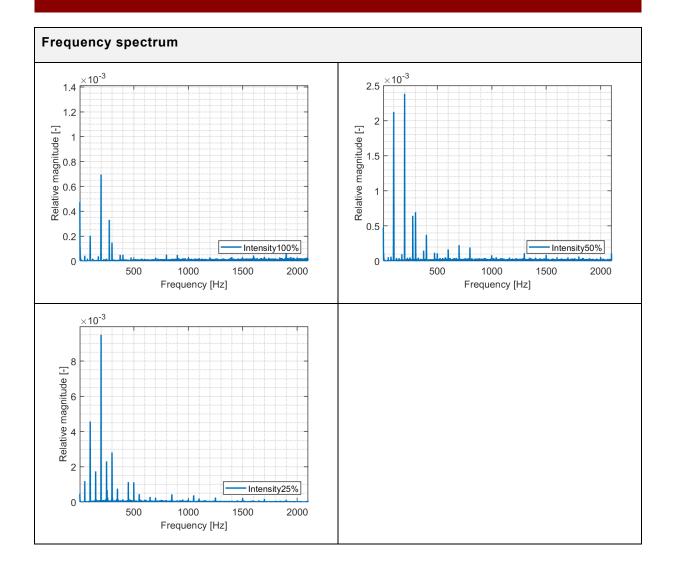




Device ID	L32	229							
Temporal light modulation results / flicker									
Intensity *)	Power [W]	PF [-]	Flicker	Modulation	SVM [-]	PstLM [-]			
			Index [-]	Depth [%]					
100 %	48.1	0.98	0.0	0.4	0.003	0.0032			
50 %	24.8	0.95	0.0	0.8	0.0092	0.0060			
25 %	12.6	0.82	0.0038	2.24	0.0279	0.0154			
Waveform									
1	Naveform of light ir	itensity	1	Waveform	of light intensity				
0.8 - - - - - - - - - - - - -	20 30 Time (ms)	Intensity100%	0	0 10 20		ensity50%			
	Waveform of light in	tonsity							
1 0.8 (in e).6 0.4 0.2 0 0 0 10	20 30 Time (ms)	Intensity25%							



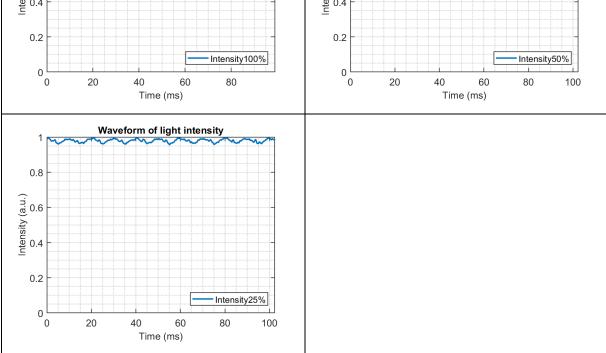






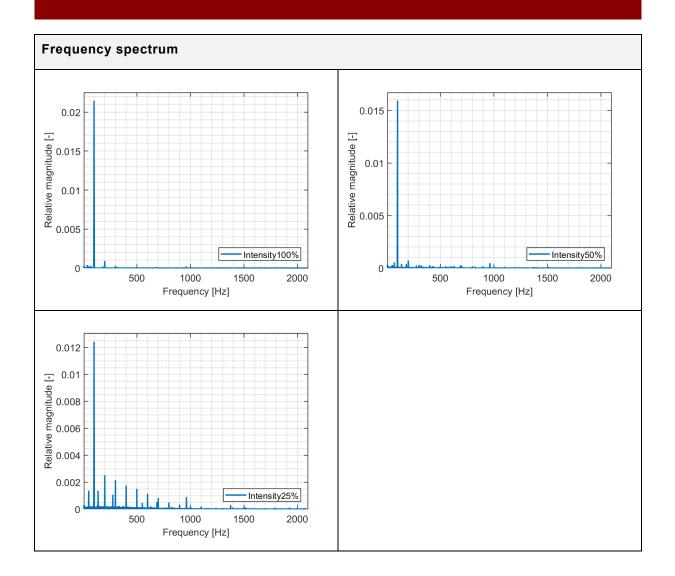


Device ID	L3:	2264					
Temporal lig	ht modulation	results / flio	cker				
Intensity *)	Power [W]	PF [-]	Flicker		Modulation	SVM [-]	PstLM [-]
			Index [-]		Depth [%]		
100 %	43.9	0.96	0.0067		2.6	0.0837	0.0963
50 %	21.7	0.87	0.0052		2.2	0.0621	0.1437
25 %	10.4	0.59	0.0043		2.5	0.0484	0.1882
Waveform			L		L	1	1
1 8.0 9.0 (3. ú.) 4.0	Waveform of light i	ntensity		1 Intensity (a.u.) 9.0 (a.u.) 9.0 (a.u.)		of light intensity	-
0.2			0.2				





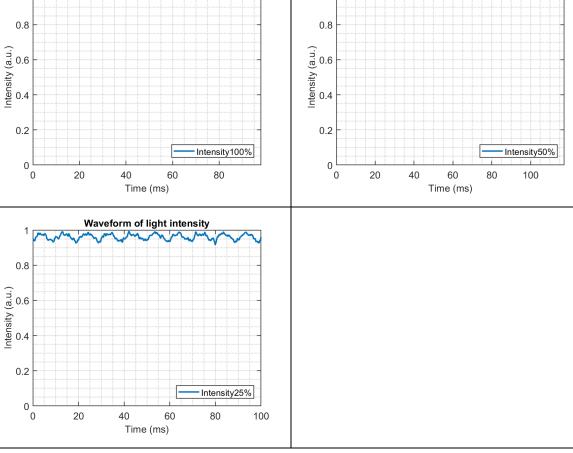






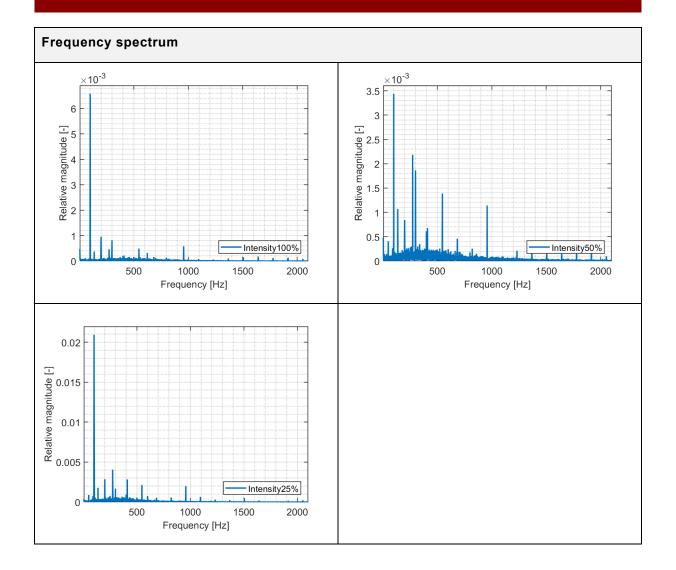


Device ID	D L32265							
Temporal li	ght modulation	results / fli	cker					
Intensity *)	Power [W]	PF [-]	Flicker		Modulation	SVM [-]	PstLM [-]	
			Index [-]		Depth [%]			
100 %	115	0.99	0.0022		1.3	0.0257	0.0604	
50 %	58.4	0.97	0.0019		2.5	0.0136	0.0925	
25 %	29.5	0.88	0.0068		4.33	0.0820	0.1860	
Waveform		I			L	1		
Waveform of light intensity								
0.8			-	0.8				
(in a) (i				0.0 (a.u.)				
- 0.0				Intensity (a.u.) 60				













Test of temporal light modulation in street luminaires

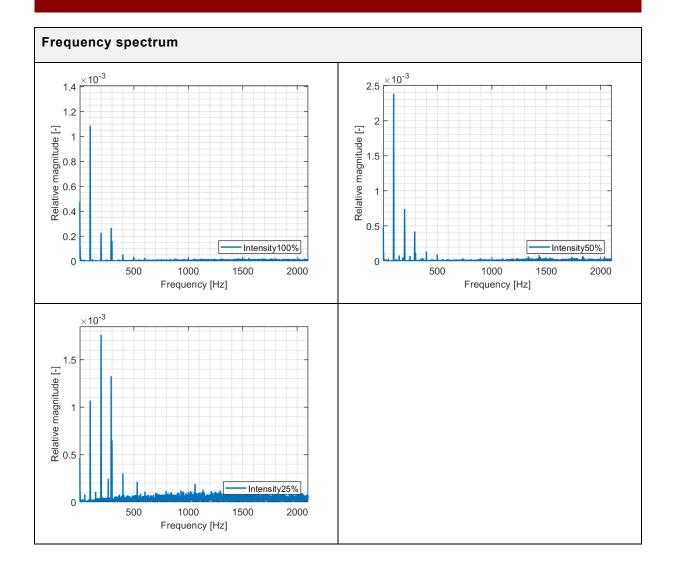
Device ID Tempora		modula	L32: tion r		/ flic	ker										
Intensity ^{*)} Power [W] PF [-] Flicke		er	Modulation				SVM [-]]	PstLM [-]						
-			_					Depth [%]				_				
100 %		66.8		0.99		0.0		0.3			0.0045			0.0058		
50 %		33.7		0.97		0.0		0.7			0.0094			0.0411		
25 %		16.4		0.88		0.001		1.9			0.0058			0.0086		
Waveforr	n															
Waveform of light intensity					1		v	Nave	form o	of ligh	it inte	nsity				
1																
0.8							0.8									
6.0 (a.u.							6.0 ⁽			3						
- 9.0 (a.u.)							Intensity (a.u.) 70 90									
											÷					
0.2				Intens	ity100%]	0.2							Int	ensity5	0%
0	20	40	60	80	100		0)	20		40		60		1000 1000	100
		Time	e (ms)								Tin	ne (m	s)			
1	v	Vaveform of	light int	tensity	-											
0.8																
6.0 (a.u.																
- 6.0 (a.u.)																
0.2																

Intensity25%

Time (ms)











Measurement references:

[1] CIE TN 006:2016: Visual Aspects of Time-Modulated Lighting Systems – Definitions and Measurement Models. (2016). http://files.cie.co.at/883_CIE_TN_006-2016.pdf

[2] BS PD IEC/TR 63158:2018 "Equipment for general lighting purposes. Objective test method for stroboscopic effects of lighting equipment"

[3] BS PD IEC TR 61547-1:2020 Equipment for general lighting purposes. EMC immunity requirement

Measurement conditions:

Laboratory ambient temperature: 25.5 °C.

Electrical operation conditions: 230 VAC, 50 Hz

Measurement uncertainties:

The measurement uncertainties in the 350-830 nm range is approximately ± 4 %

Equipment:

Туре	Device name
Flicker meter	Viso LabFlicker, E30125