

TECHNICAL EVALUATION

XENON LAMP

1/ PURPOSE

The target of this expertise is to realise technical tests for the determination of the light efficiency for different types of xenon bulbs used for 35 mm cinematographic projections. This expertise has been realised because of USHIO Europe's request from 13th of July 2009.

Methodology and objectives are defined in the technical note « CST MT 001 xenon bulbs » mentioned in the annex of this document.

2/ DESCRIPTION

Technical measurements have been done by using the following xenon bulbs:

- Nominal power 2000W : Ushio UXL 2000 HR and Philips LTIX 2000 HEH
- Nominal power 4000W : Ushio UXL 40SC and Philips LTIX 4202 HEHS
- Nominal Power 7000W : Ushio UXL 70SC and Philips LTIX 7000 HEHS

Tests have been done on the 20th and 21st of July 2009 in CST's laboratory, 22 – 24 Avenue de Saint Ouen in Paris 18th (France). A description of equipments used can be found in the MT01 CST document referenced in the annex.

3/ RESULTS

The measured results are as follows:

Nominal power 2000 W

<i>Référence</i>	LTIX 2000 HEH			UXL 2000 HR		
<i>N°</i>	8-030-239			MA 5101		
<i>Measurements</i>	321	410	325	298	417	305
	340	500	350	325	462	337
	330	405	340	322	392	335
<i>Centre luminance (cd/m²)</i>	500			462		
<i>Uniformity</i>	73,8%			76,8%		
<i>Luminance gap</i>	64,20%			64,50%		
<i>White point</i>						
<i>x</i>	0,3241			0,3263		
<i>y</i>	0,3357			0,3357		
<i>Color temperature</i>	5770		<i>K</i>	5779		<i>K</i>
<i>Intensity</i>	75		<i>A</i>	75		<i>A</i>
<i>Voltage</i>	26,26		<i>V</i>	25,3		<i>V</i>
<i>Power</i>	1969,5		<i>W</i>	1897,5		<i>W</i>
<i>Ratio</i>	0,1874			0,1870		

Nominal power 4000 W

Référence	LTIX 4202 HEHS			UXL 40 SC		
N°	7-271-261			MD 1203		
Measurements	490	610	504	450	530	430
	505	621	530	490	550	460
	504	595	512	475	500	437
Centre luminance (cd/m ²)	621			550		
Uniformity	87,2%			87,3%		
Luminance gap	78,90%			78,18%		
White point						
x	0.3254			0.3274		
y	0.3352			0.3371		
Color temperature	5825 K			5727 K		
Intensity	140 A			135 A		
Voltage	28,1 V			26,02 V		
Power	3934 W			3512,7 W		
Ratio	0,1376			0,1367		

Nominal power 7000 W

<i>Référence</i>	LTIX 7000 HEHS			UXL 70 SC		
<i>N°</i>	6-281-416			MD 0398		
<i>Measurements</i>	765	940	715	740	995	760
	825	1010	810	820	1040	840
	770	900	755	773	930	795
<i>Centre luminance (cd/m²)</i>	1010			1040		
<i>Uniformity</i>	82,4%			82,2%		
<i>Luminance gap</i>	70,79%			71,15%		
<i>White point</i>						
<i>x</i>	--			--		
<i>y</i>	--			--		
<i>Color temperature</i>	-- K			-- K		
<i>Intensity</i>	160 A			160 A		
<i>Voltage</i>	38,3 V			39,8 V		
<i>Power</i>	6128 W			6368 W		
<i>Ratio</i>	0,1358			0,1342		

4/ REMARKS

No particular difficulty appeared during the tests. We have observed:

- Luminance deviation values are slightly lower for the 2000W xenon bulbs. However, they still stay within CST's recommended range
- For all tested lamp types of various power levels, it has been checked that after 15 minutes the electrical characteristics were stable (no current variation, no voltage variation)
- No visual defect has been observed (difficult strike, arc instability, etc.)

5/ RESULT ANALYSIS

Power 2000 W

Globally, the light efficiency characteristics of the 2 tested bulbs are very much equivalent. The few differences measured are not significant.

Power 4000 W

We notice that nominal current values are slightly different. The measured results, done at nominal values given from the manufacturers, are slightly different with respect to the pure values. However, we see that the efficiency ratios are very similar.

Power 7000 W

Globally, luminance efficiency characteristics are very similar. The few difference measured are hardly significant.

6/ CONCLUSIONS

The accomplished tests for those 3 types of xenon bulbs with different power levels do not show noteworthy differences with respect to the luminance efficiency from the supplied lamps.

We notice that the xenon bulbs are not from the same type, Ushio xenon bulbs are from « normal arc » type and Philips xenon bulbs are from « short arc » type, having theoretically higher efficiency.

The received request was only related to the lighting efficiency of new xenon bulbs.

To characterize better the usage conditions of the xenon bulbs, it would be desirable to do the same tests during the lifetime of the bulbs (middle of lifetime given from manufacturer and end of warranty period for example).