



March 1st, 2018

Mr. Richard K. Struckmeyer  
Materials Safety Licensing Branch  
Division of Materials Safety, State, Tribal, and Rulemaking Programs  
Office of Nuclear Material Safety and Safeguards  
U.S Nuclear Regulatory Commission  
Mail Stop: T-8E 18  
Washington DC 20555

SUBJECT: NOT WITHHOLDING PROPRIETARY INFORMATION  
FROM PUBLIC COPY OF INFORMATION REGARD ABOUT  
TOP SHELF LED., DBA GROWER'S CHOICE NRC  
APPLICATION, REVISION 0

Dear Mr. Struckmeyer:

Attached is a version of information about our NRC application for Top Shelf LED, Inc., DBA Grower's Choice. Please see attach version without any proprietary marks. The following information in the attachment is no longer consider as proprietary.

If you have question or concerns regarding this application, please contact CEO, Leonardo Day,

at 858-381-7234, or at [info@growersc.com](mailto:info@growersc.com).

Sincerely,

Leonardo Day

CEO

03/01/2018

ITEM 5: RADIOACTIVE MATERIAL

Krypton-85

Physical Form: Gas

Maximum Activity Per Item: 14.7 ur/hr

ITEM 6: PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED

As a constituent of the fill gas in electron tubes, called arc tubes, which provide the light source for high intensity (HID) metal halide lamps. The following are the imported metal halide lamp and ceramic metal halide lamp types (families) which contain arc tubes with Krypton-85 gas we are planning to distribute.

Arc Tube-Quartz	MH-DE600W	MH-DE600W-4 K	MH-DE600W-6 K	MH-DE600W-1 0K
	MH-DE1000W	MH-DE1000W-4 K	MH-DE1000W-6 K	MH-DE1000W-10 K
	SE600W	SE600W-4K	SE600W-6K	SE600W-10K
	SE1000W	SE1000W-4K	SE1000W-6K	SE1000W-10K
Arc Tube-Ceramic poly crystalline	CMH500W			
	CMH315W	CMH315W-3K	CMH315W-4K	
	CMH630W	CMH630W-3K	CMH630W-4K	CMH630W-3K R
	CMH945W	CMH945W-3K		
	CMH 1000W	CMH1000W-3K	CMH1000W-4K	CMH1000W-3K R

This chart is for overall dimensions, the minimum and maximum dimensions for each device below.

Product Type	Overall Dimension	Inside Tube Main Part Minimum Dimension	Inside tube Main Part Maximum Dimension
MH-DE600W	388mm	323.5mm	326.5mm
MH-DE1000W	388mm	323.5mm	326.5mm
SE600W	320+/-4.0mm	193mm	187mm
SE1000W	320+/-4.0mm	197mm	203mm
CMH500W	191.5+/-3.0mm	92mm	86mm
CMH315W	194.5+/-3.0mm	92mm	86mm
CMH630W	388+/-3.0mm	330mm	N/A
CMH945W	392+/-2.0mm	330mm	N/A
CMH1000W	390+/-2.0mm	N/A	N/A

The following pages contain technical information, including drawings, regarding the above described glow switch, arc tubes and typical lamps and lamp starter containing them.

**LABELLING:** We wish to use our exempt distribution license number on the immediate container for customers who receive lamps from us requesting that their name appear on those containers (commonly called private label packaging). We also wish an exemption

to 10CFR32.15 (d) as they apply to individual tubes or switches provided that each lamp container is labeled in accordance with 10CFR32.15(d). More detail on this is covered in the pages showing technical information, reference above.

#### WAREHOUSE POSSESSION LICENSES

State of California: Pending

#### ITEM 7: INDIVIDUAL RESPONSIBLE FOR RADIATION SAFETY AND THEIR TRAINING AND EXPERIENCE

The person responsible for the E-Distribution license is Leonardo Day. He is the CEO for Top Shelf LED, Inc. This individual does not require to have radiation safety training as this license does not authorize possession of radioactive materials. This license does require knowledge of management of radiation safety program and requirement to maintain licenses in accordance with regulatory statutes. The person in his position is ideal for this type of role.

#### ITEM 8: TRAINING FOR INDIVIDUAL FREQUENTING RESTRICTED AREA

All of the warehouse staff need to wear requirement safe vest to handling all the radioactive materials. Handle radioactive materials with special training would be hold by Leonardo Day, CEO. Employees should not sign in and sign out on the enter form of the frequenting restricted area.

#### ITEM 9: FACILITY AND EQUIPMENT

All product distribution will be held at our warehouse which is located in 1500 S Milliken Ave. Unit B, Ontario, CA 91761. Possession license is pending under State of California Department of Public Health Radiologic Health Branch.. The warehouse is only distribute and possess the radioactive materials, we do not have any equipment in the warehouse.

ITEM 10: RADIATION SAFETY PROGRAM: REVISION 0.

The whole Top Shelf LED, INC Radiation Protection Program Plan is Proprietary information

**TOP SHELF LED, INC**

**Radiation Protection Program Plan**

December 11, 2017, Revision 1

**Material Management and Accountability**

Lamp products that contain krypton-85 (Kr-85) are stored in a dedicated area within TOP SHELF's warehouse distribution facility located at 1500 S. Milliken Avenue, Unit B, Ontario California. Semi-inventory of lamps containing Kr-85 will be completed, documented, kept on file with the facility's RSO and backed up on the company server.

**Operating Procedure**

All product containers are labeled with "Contains Kr-85" or "Arc Tube Contains Kr-85". Broken product will be isolated in a dedicated area of the facility and disposed of properly. Given the very low activity of Kr-85 stored and being a chemically inert gas, radioactive waste is not expected to be generated at the TOP SHELF facility.

**Audit Procedures**

An audit of the Radiation Protection Program audits will be performed once per year.

**Facility Radiation Safety Officer (RSO)**

Leonardo Day is the facility RSO has the duty and responsibility to the licensee to oversee and ensure safe operations and has the authority to stop any licensed material activities that are considered unsafe. The RSO is also responsible to ensure that licensed material activities are conducted in compliance with all of TOP SHELF's CDPH license conditions and applicable regulations.

**Reports/Record Keeping**

TOP SHELF will conduct routine inventory (at least every six months and per license condition) of lamp products that contain Kr-85 and prepare inventory reports every six months to document product quantities and possession amounts of Kr-85. The inventory reports shall be maintained for CDPH inspection. TOP SHELF will also prepare annual distribution reports of Kr-85 product shipped and submit the report to the USNRC the end of January for the prior year's shipments.

**Training**

TOP SHELF's RSO has completed RSO training conducted by a qualified instructor and received a training certificate and a radiation safety manual. Thereafter, TOP SHELF's RSO will participate in annual RSO refresher training. The training will be delivered either at the TOP SHELF facility or via webinar training. The following is the curriculum for the RSO course and refresher course:

- Introduction
- Basic Physics Review
- Quantities and Units
- How Radiations Interact with matter
- Radiation Sources (Background, Medical, Occupational)
- Kr-85 characteristics/ Lamp Products

- Radiation Exposure and Effects (acute/chronic)
- ALARA Theory (Time, Distance, Shielding)
- Instrumentation/Surveys
- Emergency Response
- Licensing and Regulations (CDPH and NRC), including CDPH notice to employees
- Radiation Protection Standards/Dose Limits
- Program Audits
- Employer/Management/workers roles and responsibilities
- Role and authority of the RSO
- Communications
- Training
- Recordkeeping
- Question/Answer Period
- EXAM, 70 % passing grade

All facility personnel are given a brief radiation safety awareness training so they are aware and understand the nature of Kr-85 contained within the lamp products.

#### **Emergency Response**

An emergency involving the radioactive products is highly unlikely to result in an exposure to facility workers or to members of the public that would require notifying the RHB-CDPH.

In the event of an emergency involving radioactive materials, such as a fire, TOP SHELF facility's safety and evacuation procedures are used to mitigate risks to workers and minimize damages. In the event of an emergency involving lamps containing Kr-85, TOP SHELF's RSO will also consult with their radiation protection consultant (i.e., TOP SHELF's certified health physicist – Jack Buddenbaum at (216) 337-4411) to determine if radiological response/mitigation measures are necessary and to decide if RHB-CDPH needs to be notified.

Immediately after ordering the evacuation, the Shift Emergency Coordinator shall contact 911 Emergency Services as needed. All emergencies are then reported to the RSO. Their phone numbers have been provided to all plant leadership.

If releases do occur a dose assessment will be completed to assess if the event presents an unacceptable radiological risk and to determine if the event needs to be reported to the RHB-CDPH. Other emergency response may be implemented if warranted based on the initial radiological assessment.

If necessary and per the regulations, the TOP SHELF RSO will contact the agency staff at the RHB-CDPH to notify them concerning the emergency incident and provide details regarding TOP SHELF's response actions. The following contact numbers will be used as appropriate to complete such notifications:

#### **Top Shelf LED DBA Grower's Choice after-hours contact number:**

858-381-7234  
1500. S Milliken Ave. Unit B  
Ontario, CA 91761

**Contact Information for Radiologic Health Branch – California  
Department of Public Health**

**Licensing Headquarters Mailing Address:**

California Department of Public Health  
Radiologic Health Branch, MS 7610  
Radioactive Materials Licensing Section  
PO Box 997414,  
Sacramento, CA 95899-7414

**Licensing Headquarters Physical Address:**

California Department of Public Health  
Radiologic Health Branch, MS 7610  
Radioactive Materials Licensing Section  
1500 Capitol Avenue, Fifth Floor  
Sacramento, CA 95814-5006  
(UPS, Fed-EX)

**Sacramento Headquarters Main Telephone Number:**

(916) 327-5106

**RHB – BREA / REGION 8 (SOUTH RAM/ICE)**

Mail Address: 500 S. Kraemer Blvd, Ste 235, Brea, CA 92821  
Main Number: (714) 524-1409  
Fax Number: (714) 524-1908

**Monitoring/Dosimetry**

Based on low Kr-85 activities in lamp products stored on site, monitoring or dosimetry is not required.

**Management of Change**

This program document must be revised as required by changes in operations at the TOP SHELF's Ontario facility, or changes in the regulations.

i. "In the event of change of facility address, or request for license termination, Grower's Choice commits to following California Code of Regulations, Title 17, § 30256 (j) and (k) regarding maintaining control of radiological areas during decommissioning and to maintain the facility under radiological control until released by the Radiological Health Branch for unrestricted use."

ii. "In the event of addition of personnel using radioactive material, the RSO will submit a license

amendment request with accompanying documentation that will demonstrate proper training requirements for staff have been met. Unsupervised staff will not work with radioactive materials until added to the license by the Radiologic Health Branch."

**TOP SHELF Security Measure to Prevent Theft or Loss**

TOP SHELF security procedures include limiting access by locking all doors and requiring a badge security system for entrance into building. Additionally, there are cameras at the entrances and other select locations. All personnel that enter and exit the facility are searched by security guards as well.

Date:\_\_\_\_\_

Signed:\_\_\_\_\_  
Radiation Safety Officer&CEO

#### ITEM 11: WASTE MANAGEMENT

Normally we do not have any radioactive waste need to be handle. However, our CEO would be available to assist the warehouse in procuring a method of disposing of broken or otherwise damaged lamps.



## ITEMS CONTAINING KRYPTON-85

### ARC TUBE TECHNICAL DATA

MANUFACTURER: Hangzhou Hanguang Illumination Co.,Ltd, China, Huangzhou

CONSTRUCTION: 1.Quartz

2. Ceramic Poly crystalline alumina (PCA)

CONTAINMENT: 1. Sealed quartz bulb

2. Sealed PCA tube

CHEMICAL FORM: Krypton/Argon mixture

RADIOACTIVE CONTENT: Krypton-85

MAXIMUM ACTIVITY PER ARC TUBE :

### PROTOTYPE TESTS:

Prototype testing to demonstrate that byproduct material is not released to the environment under the most sever conditions of normal use is not necessary because in the unlikely event of the breakage of both the lamp and arc tube, the resultant release of the very small quantity Krypton-85 would quickly dissipate to an air concentration of equal to background levels.

### QUANLITY CONTROL:

1. After manufacture, all quartz arc tubes are tested for electrical function. A quartz arc tube failing this test is considered a possible leaker and discarded. Each tank of the Argon-Krypton-85 mixture received from the supplier comes with certification as to the Krypton-85 concentration. The quantity of Krypton-85 in an arc tube is a function of the volume of the tube and the specific activity of the gas. These parameters are set at the factory and strictly monitored during production. Krypton-85 is the only radioactive gas used at the production facility, eliminating the possible use of any other radioactive material.

2. Each tank of the Argon-Krypton-85 mixture received from the supplier comes with a certification as to the Krypton-85 concentration. During manufacture, the mixture is injected into the arc tubes so a specified pressure. The arc tube production output from each of three ovens is checked for proper pressure on an ongoing basis. The sampling rate is 18 arc tubes per every 5,000 manufactured. A destructive test is performed of each selected arc tube in a sealed chamber and the resultant pressure gradient measured. If the pressure is not within specification, the production run since the last successful QC test of the oven in question is withheld from further production and the necessary adjustments made to the oven, prior to any further production. The machine the manufacture is using for introduce the gas in and seal the tube is called tube exhaust machine.

3. All product containers are labeled with "Contains Kr-85" or "Arc Tube Contains Kr-85". All defective or broken product will be isolated in a dedicated area of the facility and disposed of properly. It would be transfer to any other facility or users. Given the very low activity of Kr-85 stored and being a chemically inert gas, radioactive waste is not expected to be generated at the TOP SHELF facility.

#### 4. RADIATION LEVEL:

The radiation level of our bulbs is 14ur/hr. All lamps readings are equal to background levels. Top Shelf LED., INC consulting with Plexus Scientific Corporation about all of bulbs that contain Kr-85. Plexus Scientific Corporation did Kr-85 test on all of our bulbs. They were using the Specific Gamma-Ray Dose Constant for Kr-85 (i.e., 0.00156584 uR/hour per uCi at one meter)[1], the estimated exposure rate at 1 centimeter (assuming no attenuation from intervening product material; e.g., quartz lamp envelope) for a 0.27 uCi lamp is calculated to be approximately 0.04 uR/hr. In 2017 Growers' also performed confirmatory measurements of lighting products that contain Kr-85. Measurements were collected using a calibrated Ludlum Model 9DP ion chamber. All readings collected at 1 centimeter from the surfaces of each lamp product containing Kr-85 were indistinguishable from background. As such, all readings are well below the 1 millirad per hour limit specified in 10 CFR 30.15(a)(8).

Detail report in attachment 1.


PLEXUS SCIENTIFIC CORPORATION  
RADIOLOGICAL SURVEY FORM

Survey No. <u>01</u>		Instrument SN <u>908/25607790</u>		Calibration Due <u>4-18-18</u>	Date <u>12-18-17</u>	Time <u>10:30 AM</u>
Instrument SN		Calibration Due		Location <u>Cleveland Office</u>		
Purpose <u>Dose Rate measurements on Top Shelf, LEC Lighting/ lamp products w/ Kr-85</u>						
Survey Performed By (Signature) <u>Jack Buchanan</u>				Survey Checked By (Signature) <u>grm</u>		
<input checked="" type="checkbox"/> Battery OK <input checked="" type="checkbox"/> HV OK <input checked="" type="checkbox"/> Source Check OK		Action Level <u>1 mR/hr</u> <input checked="" type="checkbox"/> 0.01 mR/hr <input type="checkbox"/> 0.02 mR/hr <input type="checkbox"/> 0.05 mR/hr <input type="checkbox"/> 0.1 mR/hr		Grid Dimension <input type="checkbox"/> 10 meters <input type="checkbox"/> 100 feet <input type="checkbox"/> 100 meters <input type="checkbox"/> 1000 feet		


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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1. 315 W Ceramic Metal Halide Lamp




14  $\mu$ R/hr

2. 1000 W LEC DL



14  $\mu$ R/hr

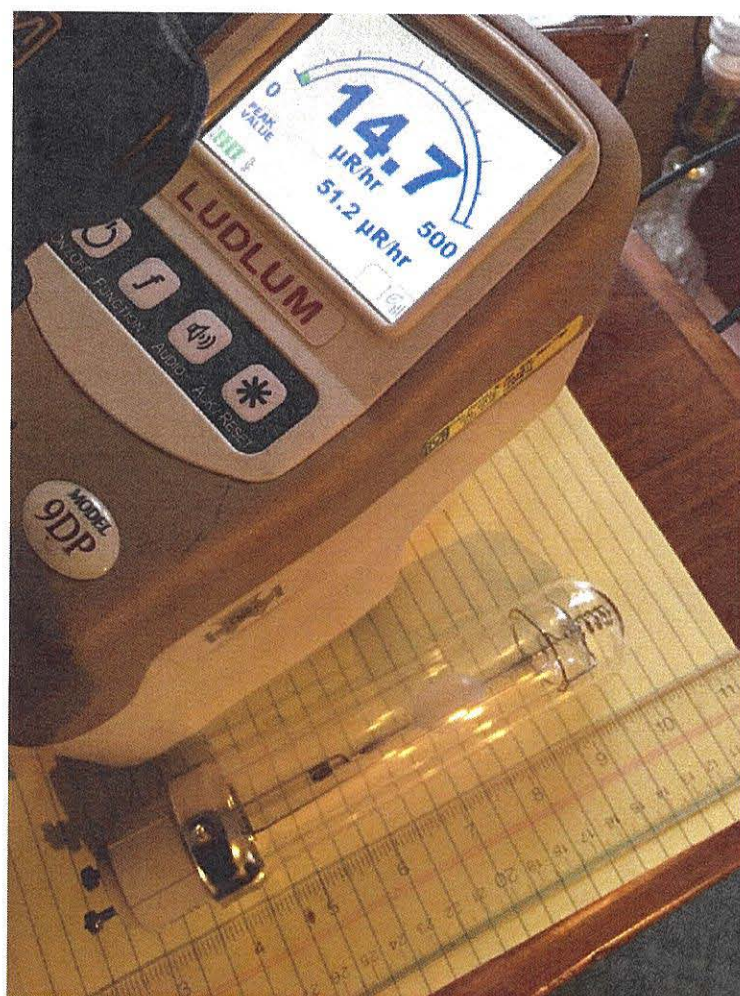
3. 630 W DF Ceramic Metal Halide Lamp

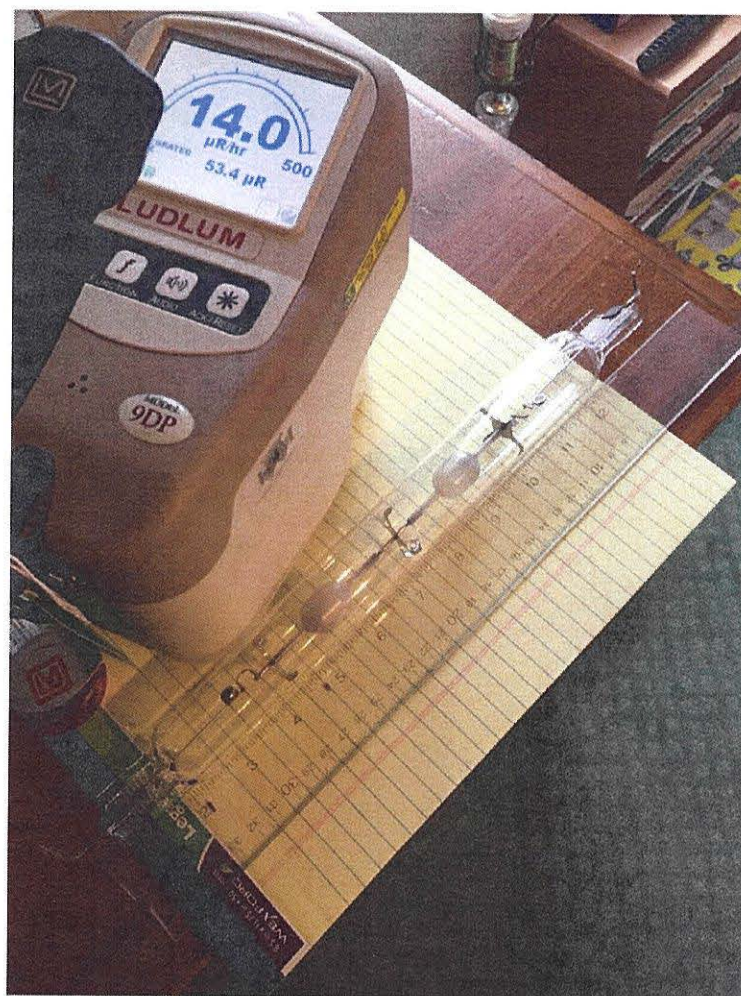


14  $\mu$ R/hr

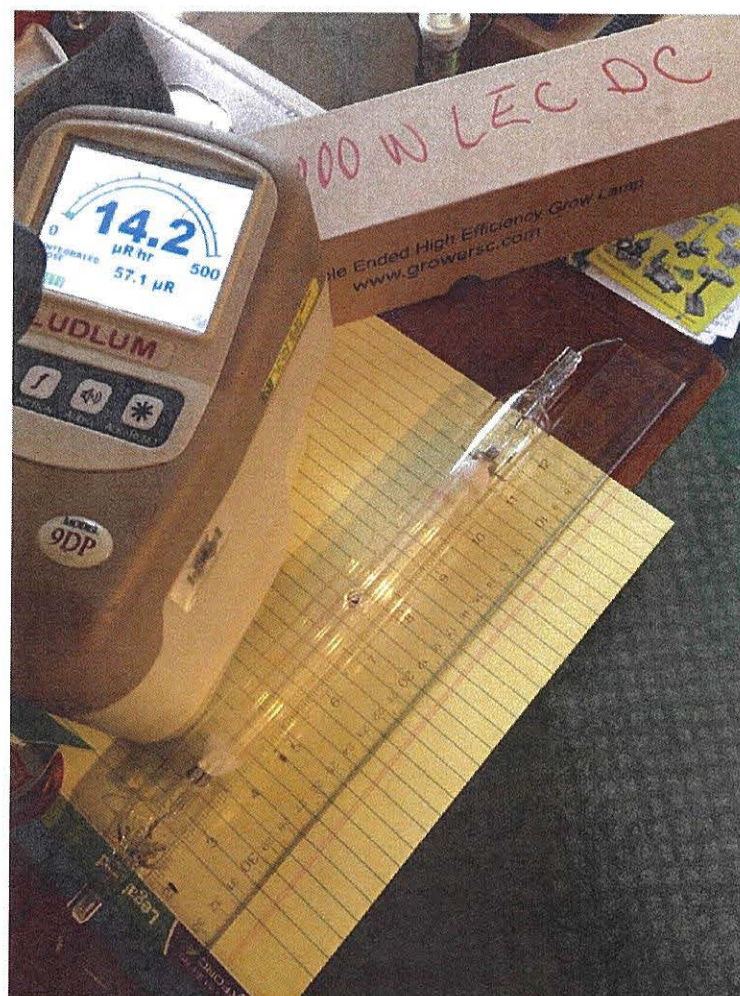
Background Readings 11  $\mu$ R/hr - 15  $\mu$ R/hr

- All lamps readings equal to background levels.
- Photographs attached
- Instrument Calibration Certificate attached.











Designer and Manufacturer  
of  
Scientific and Industrial  
Instruments

www.ludlum.com

# CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

501 Oak Street

325-236-6401

Sweetwater, TX 79559, U.S.A.



CERT # 4064.01

Customer **PLEXUS SCIENTIFIC CORP**

ORDER NO.

20310031/448534

Mfg. **Ludlum Measurements, Inc.**

Model

9DP

Serial No.

25007790

Mfg.

Model

Serial No.

Cal Date **18-Apr-17**

Cal Due Date

18-Apr-18

Cal Interval

1 Year

Moisture

Digital

Check mark ☒ Applies to applicable instr. and/or detector IAW mfg. spec.

T

73

\*F

RH

49

% Alt

705.0

mm Hg

New Instrument

Instrument Received

☐ Within Toler.  $\pm 10\%$

☒ 10-20% ☐ Out of Tol.

☐ Requiring Repair

☐ Other-See comments

☒ Mechanical ck

☐ Meter Zeroed

☐ Background Subtracted

☐ Input Sens. Linearity

☐ F/S Resp. ck

☒ Reset ck.

☐ Window Operation

☐ Geotrapism

☒ Audio ck

☐ Alarm Setting ck.

☒ Batt. ck

☐ Calibrated in accordance with LMI SOP 14.8

☒ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set

V Input Sens.

mV Det Oper

V at

mV

Threshold

Dist Ratio

=

mV

☐ HV Readout (2 points)

Ref./Inst.

/

V

Ref./Inst.

/

V

## COMMENTS:

Instrument is auto-ranging.

Peak Volt & Integrated Code are the Available functions.

All recommended features are currently, set to off.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44 B in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
Auto	4 R/hr	3.50 R/hr	4.00 R/hr
Auto	1 R/hr	0.92	1.04
	400 mR/hr	397 mR/hr	397 mR/hr
	100 mR/hr	100	100
	40 mR/hr	32.4	40.0
	10 mR/hr	8.91	9.48
	4 mR/hr	3.80	4.00
	1 mR/hr	0.94	1.01
	400 $\mu$ R/hr	415 $\mu$ R/hr	400 $\mu$ R/hr
	100 $\mu$ R/hr	98.2	92.6

\*Uncertainty is  $\pm 10\%$  C.I. within  $\pm 20\%$

Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout			Log Scale		

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration service of other international Standards Organizations, or has been calibrated from detectors tested of non-statistical constants or have been derived by the ratio of two calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1:1994 and ANSI/NCSL Z540-1:1995. ISO 9001:2008 (E) State of Texas Calibration License No. LO-1063

Reference Instruments and/or Sources: Cx-152 S/N 1253 ☒ 2171CP ☐ 2201CP ☐ 2220 ☐ 734 ☐ 741 ☐ 1131 ☐ 1151H ☒ 1500 ☐ 1500R ☐ 915CP ☐ 2300-2501 ☒ 2711CG ☐ 5719CG ☐ 60510 ☐ 70257 ☐ 73410 ☐ 8562 ☐ 0112 ☐ 2155CP ☐ 5324 ☐ 51054 ☐ 110081 ☐ 110082 Audiotape 241 RA ☐ 1-304 RA 226 ☐ 9502

☐ Alpha S/N ☐ Beta S/N ☐ Other

☐ m 500 S/N ☐ Oscilloscope S/N ☐ Multimeter S/N

Calibrator **James McBeth** Title **Calibrator** Date **18 APR 17**

QC'd By **James McBeth** Title **QC** Date **18 APR 17**

This certificate shall not be reproduced except by the written approval of Ludlum Measurements, Inc.

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AC Test Only ☐ Passed (Electrolytic Cell) and Continuity Test ☐ Failed

## Dimension Configuration Manager - Calibration Report

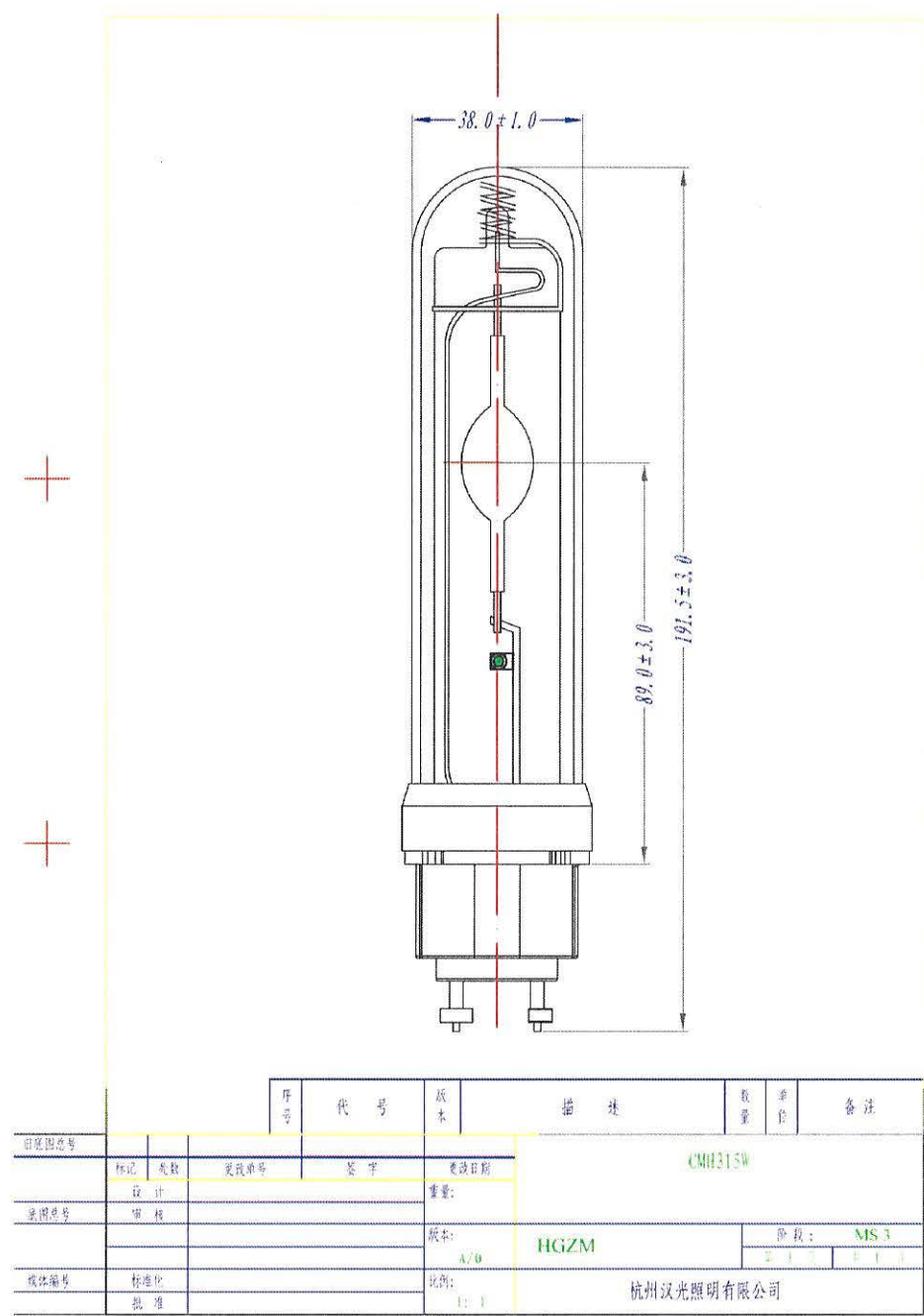
Ludlum Measurements, Inc.  
501 Oak Street  
Sweetwater, Texas 79556 USA  
Toll Free: (800) 622-0828  
Voice: (325) 235-5494  
Fax: (325) 235-4672  
<http://www.ludlums.com/>

Report Generated: 18 Apr 2017 10:19:39

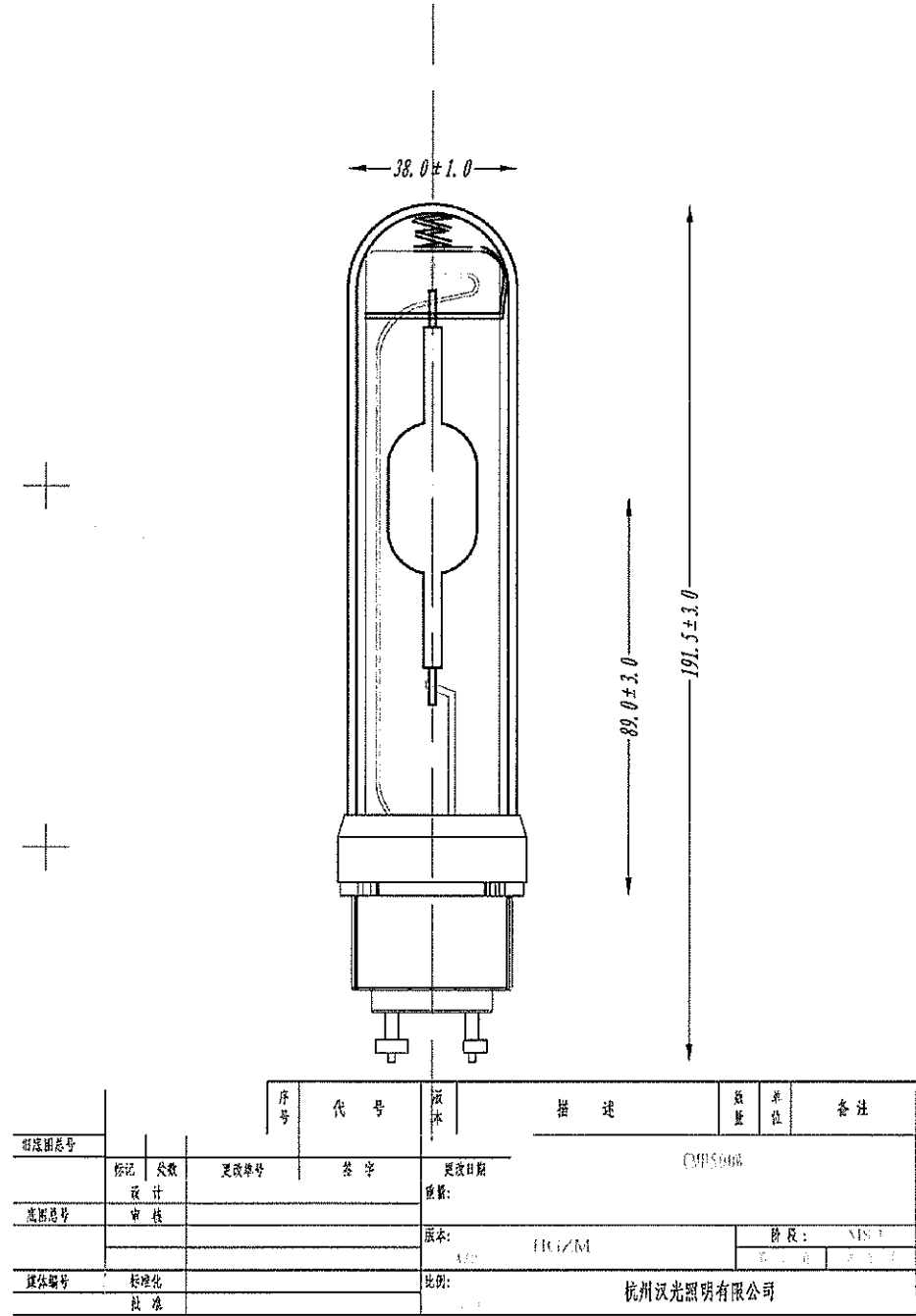
LMI Model	9DP
Firmware Version	29307.01.02.17
LMI Serial Number	25007790
Calibration Date	18 Apr 2017
Calibration Due Date	18 Apr 2018
Time Format	12 Hours (AM/PM)
ADC Offset Reading	0
ADC Offset	0
High Voltage DAC 1 Offset	-11
HV Correction	978
High Voltage Reading 1	-87.7
Battery Correction	979
Battery Reading	11.23
Meter Offset 1	900
Meter Offset 2	952
Meter Offset 3	1029
Electrometer Offset	1507
Electrometer Temperature	26.8
Cold Temperature Offset	0.000
Hot Temperature Offset	-1.500
Jitter Threshold	30.0
Checkout Technician	James McBeth
Checkout Date	18 Apr 2017
Calibration Constant Range x1	692
Calibration Constant Range x10	663
Calibration Constant Range x100	1016
Calibration Constant Range x1k	1004
Calibration Constant Range x10k	1093
Calibration Technician	James McBeth



CMH 315W Typical PCA Arc Tube Construction Detail Drawing



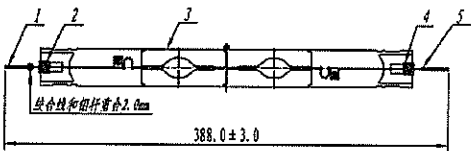
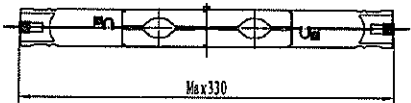
CMH 500W Typical PCA Arc Tube Construction Detail Drawing



CMH 630W Typical PCA Arc Tube Construction Detail Drawing

技术要求:

- 1.陶瓷件安装无松动,脱,歪斜现象;
- 2.灯泥适量,光板上不能有太多的灯泥;
- 3.陶瓷件组装后配用CVA-400V镇流器老化4分钟,管压:190±15V;
- 4.铁合线焊接牢固,不能分叉,刺手;
- 5.单位:mm.



5	300D00001400	A/O	铁皮4×10×0.1	2	pc	
4	300F00002000	A/O	陶瓷件(白色)	2	pc	
3	240100006000	A/O	B陶瓷金卤灯CMH630, 830, T32, S, DE, B2-高光效	1	pc	
2	400C00000400	A/O	双端灯泥	2	g	
1	300B00005600	A/O	铁合线28×Φ1.8	2	pc	
序号	代 号	版本	描 述	数量	单位	备注

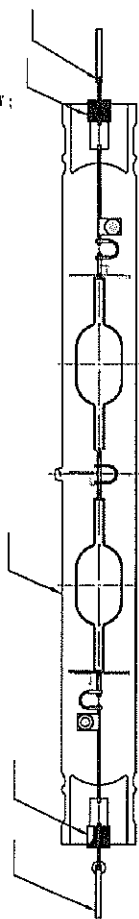
图样图号	标记	数量	更改序号	签字	更改日期	陶瓷金卤灯CMH630, 830, T32, S, DE, B2-高光效		
	设计				数量:			
图样总号	审核				版本:	HGZM130500001D00		
					A/O			
图样编号	标准				比例:	第 1 页 共 1 页		
	批准				1: 4			

杭州汉光照明有限公司

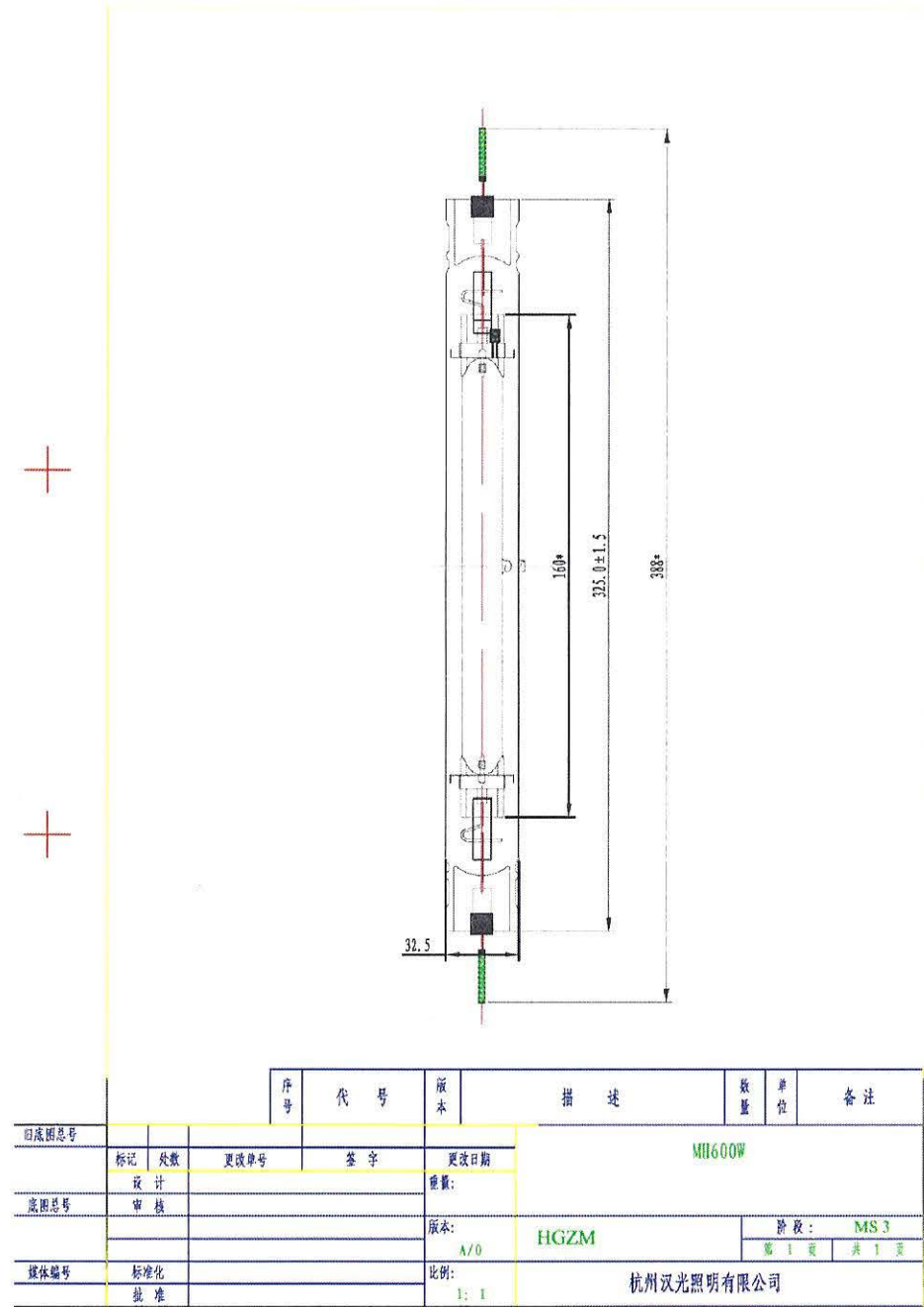
[illegible]

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[illegible]

MH 600W Quartz Arc Tube Construction Detail Drawing



			序号	代 号	版本	描 述	数量	单位	备 注
旧版图总号						<div><div></div><div>MH1000W</div></div>			
	标记	页数	更改单号	签 字	更改日期				
新版图总号			设计	位置:					
					版本:	HGZM	阶段: MS 3		
					A/0		第 1 页 共 1 页		
媒体编号			标准化	比例:		杭州汉光照明有限公司			
			批准	1: 1					

Attachment 3. Package Design

GC CMH315W 3K  
53\*53\*215MM  
250g灰板纸裱白E瓦 覆亮膜

