



LM-79-08 Test Report

for

SIRS Electronics Inc.

6101 N. 23rd Street, Suite K, McAllen TX 78504, USA

LED Retrofit Kit

Model: LED-RETROFITKIT-WH

Laboratory: Leading Testing Laboratories Texas Branch

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Report No.: UT16030004 (rev. 1)

Reviewed / Approved by:

A handwritten signature in black ink, appearing to be 'Yang Wang', written over a horizontal line.

Manager: Yang Wang

Date: Mar 25, 2016

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

TEST SUMMARY

Sample Tested: LED-RETROFITKIT-WH

Luminous Efficacy (Lumens /Watt)	Total Luminous Flux (Lumens)	Power (Watts)	Power Factor
71.6	4728.3	66.04	0.5323
CCT (K)	CRI	Stabilization Time (Light & Power)	
6176	84.3	30 mins	

Table 1. Executive Data Summary

Test specifications:

Date of Receipt : Mar 21, 2016
Date of Test : Mar 23, 2016
Test item : Total Luminous Flux, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard : IESNA LM-79-2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products



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SAMPLE PHOTO

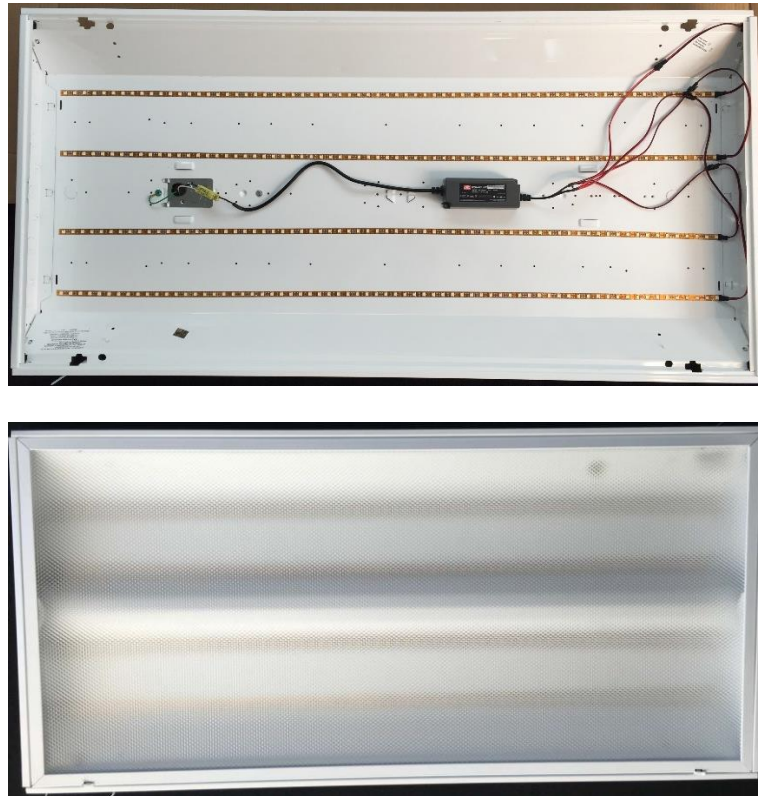


Figure 1- Overview of the sample

Equipment Under Test (EUT)

Name	: LED Retrofit Kit (installed in Lithonia 2GT8 lensed 2X4 troffer)
Model	: LED-RETROFITKIT-WH
Electrical Ratings	: 120VAC, 60Hz, 56.32W
Product Description	: 6500K, 4500lm, LED-RETROFITKIT-WH
Manufacturer	: SIRS Electronics Inc.
Address	: 6101 N. 23rd Street, Suite K, McAllen TX 78504, USA

TEST RESULTS

Test ambient temperature was 25.4⁰C. Relative humidity was 55%.

Base orientation was light down. Test was conducted without a dimmer in the circuit.

The stabilization time of the sample was 30 minutes, and the total operating time including stabilization was 30 minutes.

Parameter	Result	Special Color Rendering Index	
Test Voltage (V)	119.97	R1	85.30
Voltage frequency (Hz)	60.003	R2	85.00
Test Current (A)	1.034	R3	85.90
Power Factor	0.532	R4	85.80
Test Power (W)	66.04	R5	84.60
Luminous Efficacy (lm/W)	71.6	R6	81.80
THD A%	151.72	R7	88.30
Total Luminous Flux (lm)	4728.3	R8	78.00
Color Rendering Index (CRI)	84.3	R9	26.10
R9	26.1	R10	65.20
Correlated Color Temperature (CCT) (K)	6176	R11	85.90
Chromaticity Chroma x	0.317	R12	60.40
Chromaticity Chroma y	0.3496	R13	84.80
Chromaticity Chroma u	0.1933	R14	92.30
Chromaticity Chroma v	0.3197		
Duv	0.0113		
Chromaticity Chroma u'	0.1933		
Chromaticity Chroma v'	0.4796		
Fidelity Index R _f	80		
Gamut Index R _g	100		

Table 2. Test Data per Integrating Sphere Method

Note: According to CIE 1976 (u',v') diagram, $u' = u = 4x/(-2x+12y+3)$, $v' = 3v/2 = 9y/(-2x+12y+3)$.

SPECTRAL POWER DISTRIBUTION

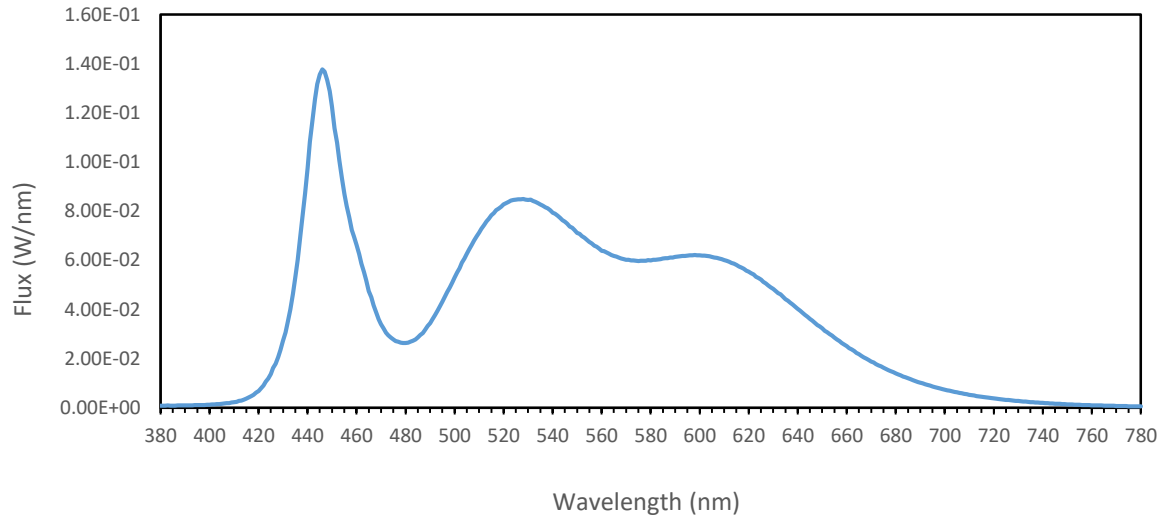


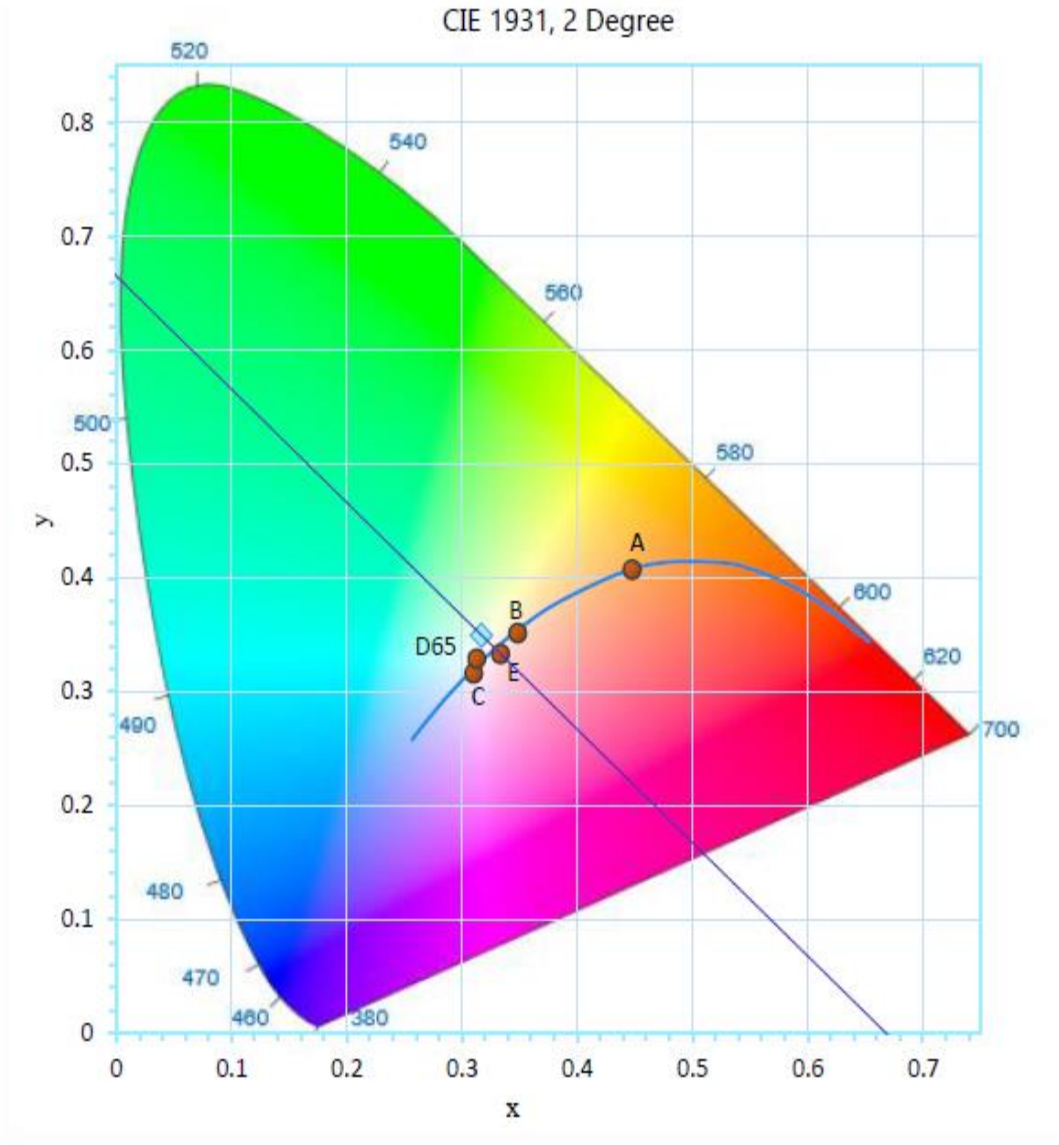
Chart 1. Spectral Power Distribution

Spectral power distribution in visible wavelength							
WL(nm)	Flux (Watts/nm)	WL(nm)	Flux (Watts/nm)	WL(nm)	Flux (Watts/nm)	WL(nm)	Flux (Watts/nm)
380	9.07E-04	485	2.86E-02	590	6.14E-02	695	8.66E-03
385	8.74E-04	490	3.45E-02	595	6.19E-02	700	7.42E-03
390	9.58E-04	495	4.31E-02	600	6.20E-02	705	6.28E-03
395	1.08E-03	500	5.30E-02	605	6.15E-02	710	5.32E-03
400	1.26E-03	505	6.26E-02	610	6.02E-02	715	4.51E-03
405	1.63E-03	510	7.13E-02	615	5.81E-02	720	3.81E-03
410	2.28E-03	515	7.83E-02	620	5.54E-02	725	3.25E-03
415	3.70E-03	520	8.28E-02	625	5.21E-02	730	2.75E-03
420	6.89E-03	525	8.47E-02	630	4.84E-02	735	2.32E-03
425	1.37E-02	530	8.46E-02	635	4.42E-02	740	1.97E-03
430	2.73E-02	535	8.28E-02	640	4.04E-02	745	1.68E-03
435	5.27E-02	540	7.94E-02	645	3.61E-02	750	1.42E-03
440	9.76E-02	545	7.58E-02	650	3.23E-02	755	1.21E-03
445	1.36E-01	550	7.12E-02	655	2.85E-02	760	1.04E-03
450	1.23E-01	555	6.75E-02	660	2.51E-02	765	8.89E-04
455	8.69E-02	560	6.39E-02	665	2.18E-02	770	7.62E-04
460	6.62E-02	565	6.18E-02	670	1.88E-02	775	6.53E-04
465	4.75E-02	570	6.02E-02	675	1.63E-02	780	5.61E-04
470	3.41E-02	575	5.97E-02	680	1.40E-02		
475	2.78E-02	580	6.00E-02	685	1.20E-02		
480	2.64E-02	585	6.07E-02	690	1.02E-02		

Table 3. Total Spectral Flux



CHROMATICITY DIAGRAM



Tristimulus values(x, y): (0.3170, 0.3496)

Chart 2. Chromaticity Diagram

Note: The location on the diagram of the tri-stimulus coordinates is indicated by the blue diamond.

NORMAL CCT QUADRANGLES

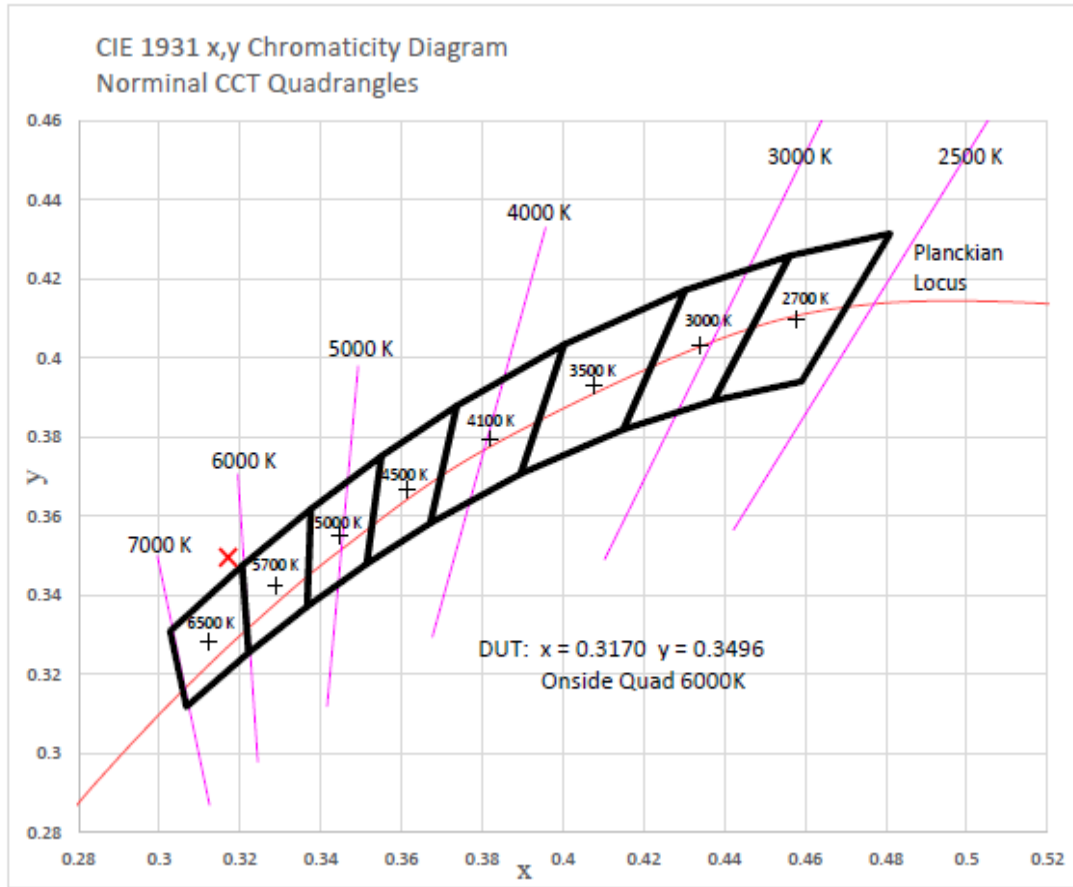


Chart 3. Plot of lamp x, y coordinates on CIE 1931 Chromaticity Diagram

TM-30 COLOR VECTOR GRAPHIC

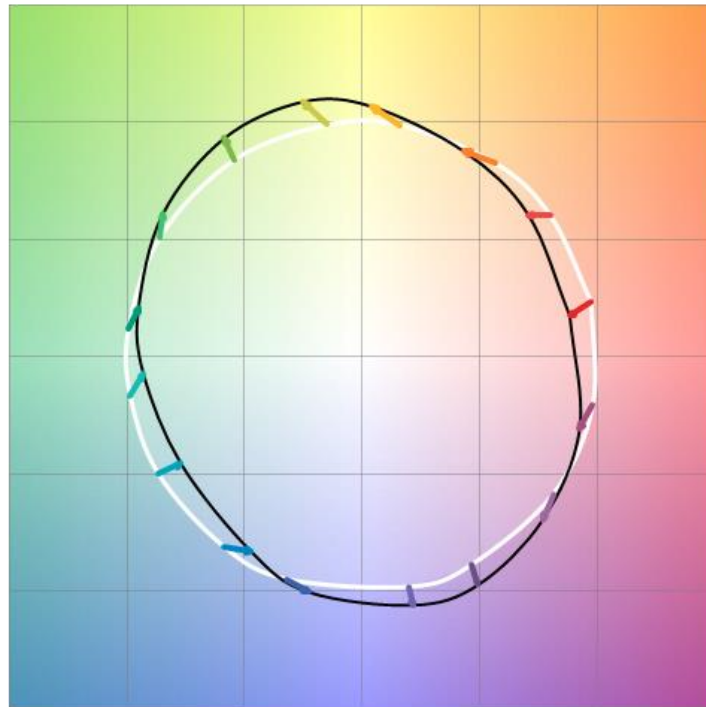


Chart 4. Chromaticity Diagram

Hue Bin	R_f	Graphic shifts (%)	
		Chroma	Hue
1	80	-10%	-4%
2	82	-8%	6%
3	71	-3%	14%
4	75	5%	13%
5	79	12%	8%
6	84	10%	-1%
7	84	4%	-9%
8	83	-2%	-10%
9	83	-7%	-8%
10	80	-10%	2%
11	79	-5%	11%
12	78	4%	10%
13	86	8%	0%
14	88	9%	-2%
15	80	2%	-12%
16	81	-3%	-11%

Table 4. TM-30 Hue angle bin chart

EQUIPMENT LIST

Test Equipment	Model	Equipment No.	Calibration Date	Calibration Due date
Sphere Spectroradiometer	ZWL-9200GT	UT-TE-002-01	12/11/2015	1/11/2016
Goniophotometer system	ZWL-M9000	UT-TE-001-01	12/11/2015	1/11/2016
Digital Power Meter	WT310	UT-TE-001-13	4/9/2015	4/9/2016
AC Power Supply	IT7300	UT-TE-001-14	NA	NA
AC Power Supply	IT7321	UT-TE-002-08	NA	NA
Temperature and humidity recorder	TES-1310	UT-TE-003-01	8/20/2015	8/20/2016
Standard source	Labsphere SCL-1400	UT-TE-006-01	6/16/2014	TBD

Table 5. Test Equipment List

TEST METHODS

Seasoning of SSL Product

For the purpose of rating new SSL products, SSL products shall be tested with no seasoning. Therefore, no seasoning was performed.

Sphere-Spectroradiometer Method- Photometric and Electrical Measurements

A ZVISION model ZWL-9200GT Spectroradiometer (with two meter sphere) was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit. The coating reflectance of each sphere is 98%. The measure geometry is 4π . Self-absorption correction is conducted in testing. Bandwidth of spectroradiometer is 380nm-780nm.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation.

The stabilization time typically ranges from 30 min (small integrated LED Luminaires) to 2 or more hours for large SSL luminaires). It can be judged that stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %. Electrical measurements including voltage, current, and power were measured using the Yokogawa WT-310 power meter.

The standard reference of the integrated sphere system is halogen incandescent lamp, the intensity distribution type is omni-directional, and is traceable to the National Institute of Standards and Technology.

The uncertainty of integrating sphere system reported in this document is expanded uncertainty is 1.62% with a coverage factor $k=2$.

Goniophotometer Method- Photometric and Electrical Measurements

A ZVISION model ZWL-M9000 goniophotometer and gonio-colorimeter was used to measure the intensity

distribution for a sample. Photometric distance is set to be 55 feet. Wavelength range for colorimetric measurement is 380nm-780nm. Ambient temperature was measured at the same height as the sample. The SSL fixture sample was operated on the client provided driver (built in or standalone) at the rated input voltage in its designated orientation. The stabilization time typically ranges from 30 min (small integrated LED bulbs) to 2 or more hours (large SSL luminaires). SSL output is considered as being stable when 3 readings, 15 minutes apart, over 30 minutes period deviate from each other less than 0.5%, recommended in IESNA LM-79-08.

Electrical measurements including voltage, current, and power were measured using Yokogawa WT-310 power meter. The Goniophotometer system is calibrated for intensity and colorimetric measurement using total spectral flux reference standard lamp that is traceable to NIST. The estimated luminous intensity measurement uncertainty is 2.85% ($k=2$).

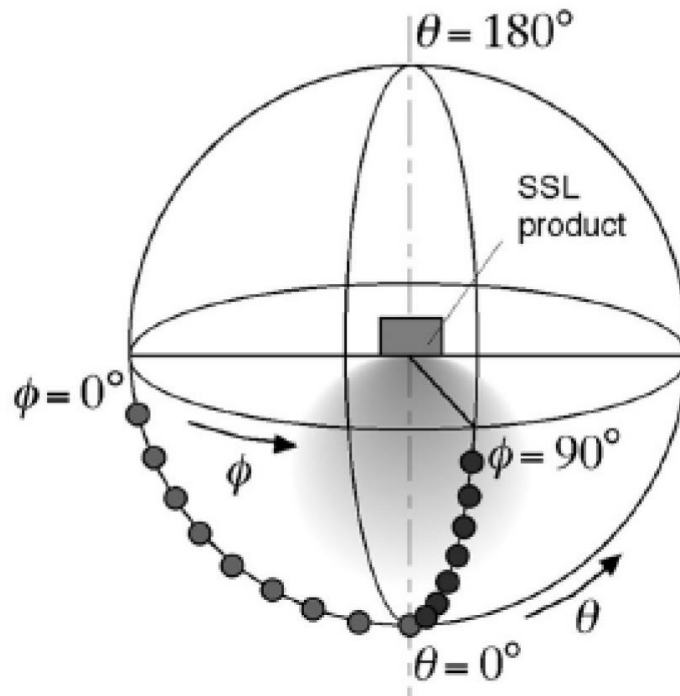
Color Characteristics Measurements

The color characteristics of SSL products include chromaticity coordinates, correlated color temperature, and color rendering index. These characteristics of SSL products may be spatially non-uniform, and thus, in order that they can be specified accurately, the color quantities shall be measured as values that are spatially average. The color characteristics measurements are using sphere-spectroradiometer.

Color Spatial Uniformity

The chromaticity characteristics of SSL products may be spatially non-uniform. The chromaticity coordinates shall be measured at two vertical planes ($C=0^{\circ}/180^{\circ}$ and $C=90^{\circ}/270^{\circ}$) and in 10° or less intervals for vertical angle until the light output dropped to below 10% of the peak intensity. The average weighted chromaticity coordinate was calculated from these points. The data was then analyzed to check for delta color differences of the (u' , v') chromaticity coordinates. The spatial non-uniformity of chromaticity, $\Delta u'v'$, is determined as the maximum deviation (distance on CIE u' , v' diagram) among all measured points from the spatial averaged chromaticity coordinates.

The geometry for the chromaticity measurement using gonio-spectroradiometer is shown as following.



*** End of Report ***

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