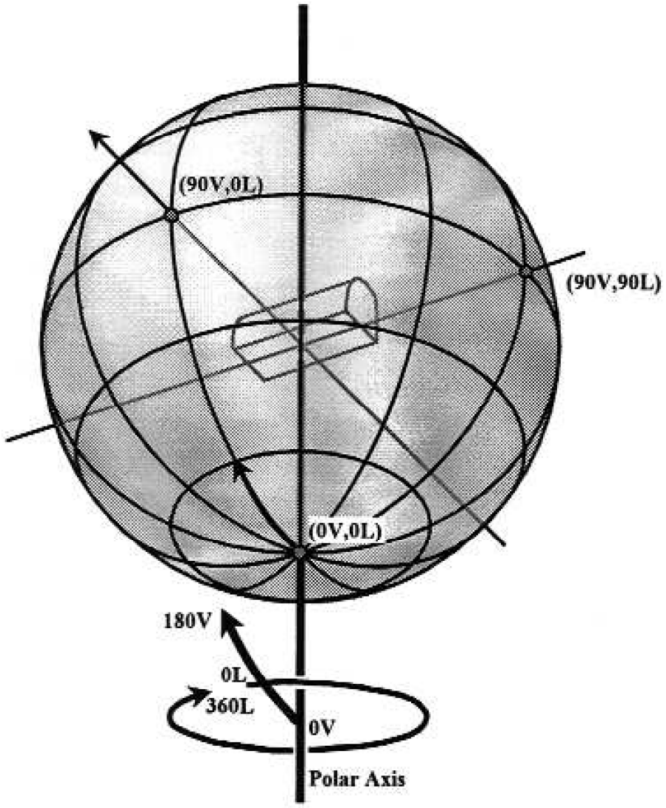
Limes 2000

Photometric measurements according to North American Conventions



Description

Photometric measurements according to North America conventions with LIMES 2000

Table of Contents

1 Introduction

The arrangement of a luminaire during the photometric measurement is the key for the subsequent interpretation of the light distribution curves. In certain luminaires, this arrangement is critical and the incorrect assignment of planes could lead to misunderstandings which are not necessarily due to mistakes in the optical design of the luminaire.

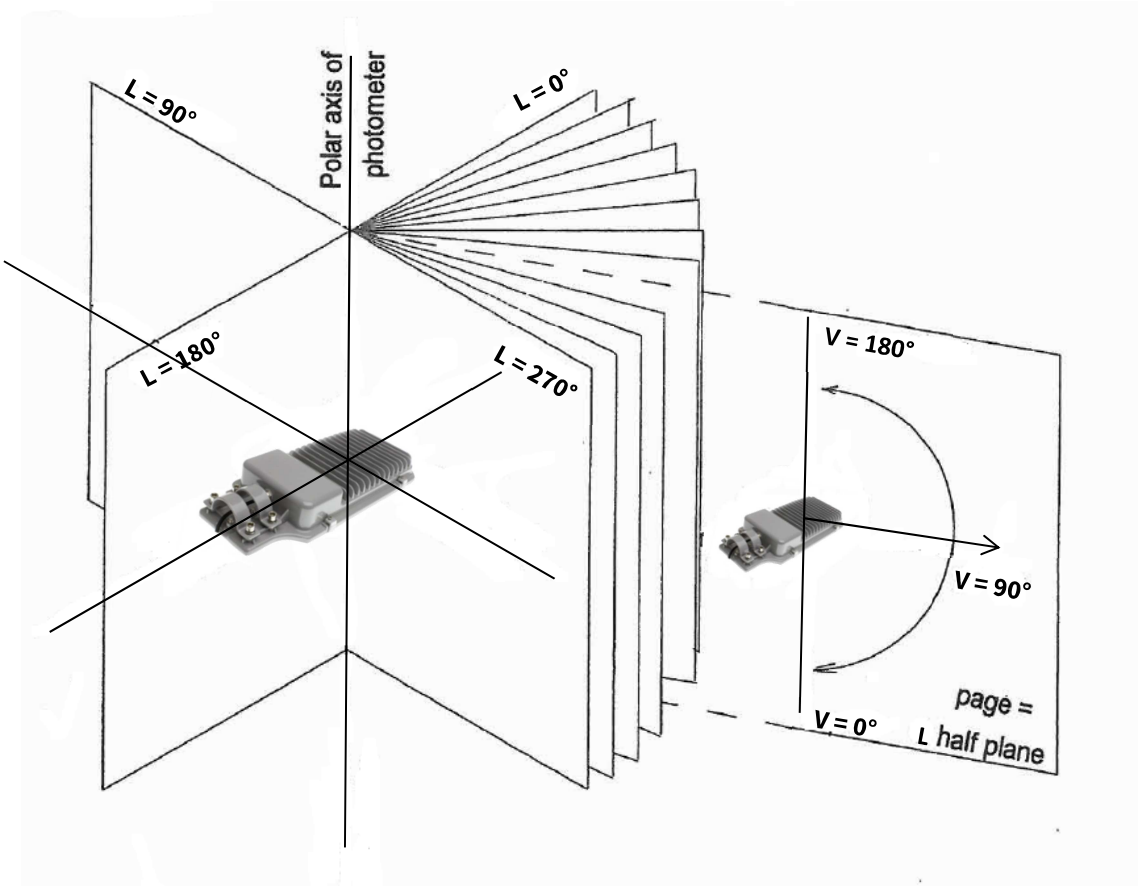
In addition, it needs to be taken into account that there is a difference between the North American (IESNA) standards and the European (EN) standards which refer to the CIE convention. Each one uses a different convention in the assignment of planes and angles of measurement.

The case that best exemplifies this difference is the measurement of road lighting luminaires.

2 Coordinate Systems

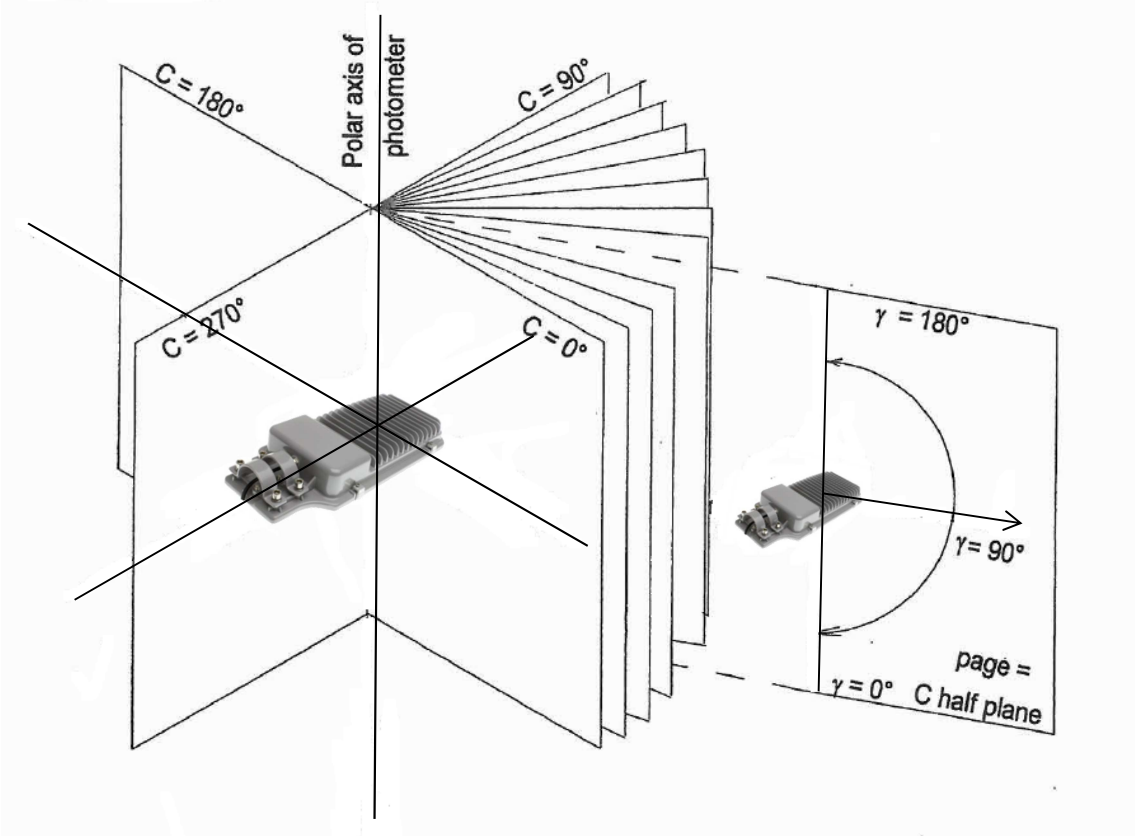
2.1 North American L,V Coordinate System

In the American convention, the plane L = 0° (the equivalent to the C = 0° plane in the European convention) is perpendicular to the curb stone edge while C = 0° is parallel to the curb stone edge. Vertical angles (e.g. V in the IESNA system) are measured in the same manner as gamma angles in the CIE standards.



Luminaire orientation according to American convention (L-V goniophotometry)

2.2 CIE and European C,γ Coordinate System



Luminaire orientation according to European and CIE convention (C-γ goniophotometry)

As can be easily seen, there is a ninety degree difference between the planes C = 0° and L = 0°. Taking into account this 90° difference, Limes 2000 has introduced the possibility of either evaluating results according to the North American or to the European respectively CIE standard. And in some special cases, one measurement with the corresponding arrangement of the luminaire can lead either to European or North American results.

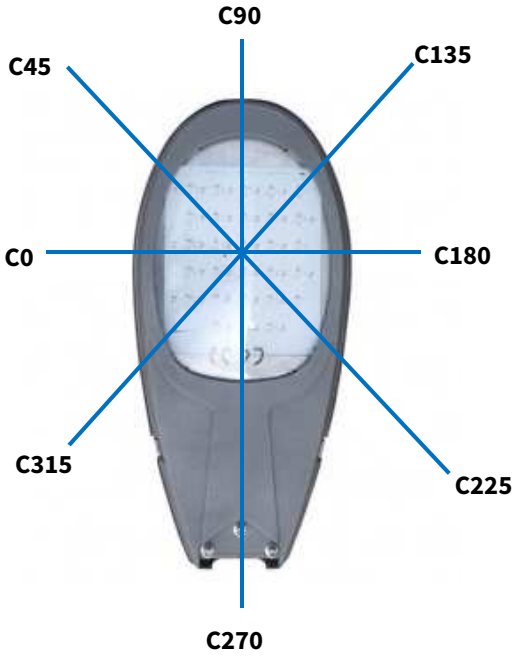
If the measurement is according to the European or CIE convention, the luminaire should be placed in a position that the first plane to be measured will be the C = 0°. If it is according the American standards, the L = 0° should be the plane located 90° from the first plane to be measured (in the rotation direction).

Once the arrangement of the luminaire in the goniometer is clear, the next step is to create a measurement program that fits the requirements of the different standards. And in this point there are also considerable differences between both European and North American conventions. In North America standards lateral planes are not always equidistant depending on the DUT.

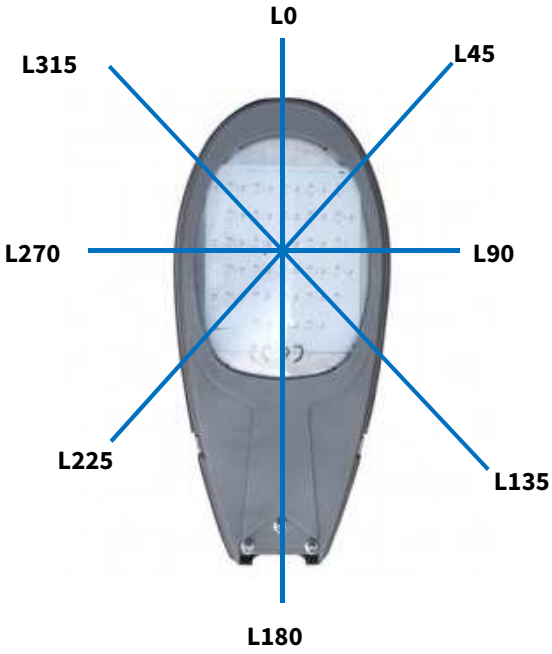
Therefore, this has to be taken into account while creating a measurement program in Limes 2000. We assume that the DUT is a roadway luminaire and the lateral planes (North America) to be measured are for instance as follows:

0° - 30°	in steps of	2.5°
30° - 90°	in steps of	5°
90° - 270°	in steps of	10°
270° - 330°	in steps of	5°
330° - 357.5°	in steps of	2.5°

In order to use the same measurement programs for CIE (European) and IESNA notation the program definition still uses C-plane convention. Furthermore, the display at the machine will always show C,γ. Therefore, the 90° difference should be kept in in mind once the corresponding C-planes are defined in the measurement program (see chapter 3 below).



European or CIE C-planes

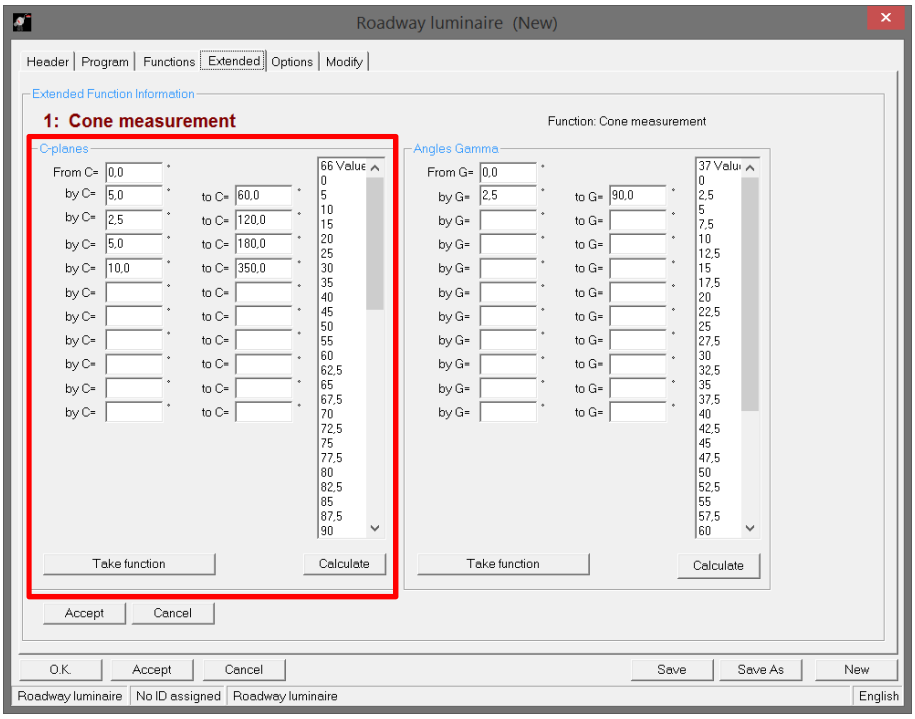


North American L-planes

3 Change in measurement programs

3.1 Plane definition

In order to insert the correct information during creation of a new measurement program, the Tab “Extended” becomes important.

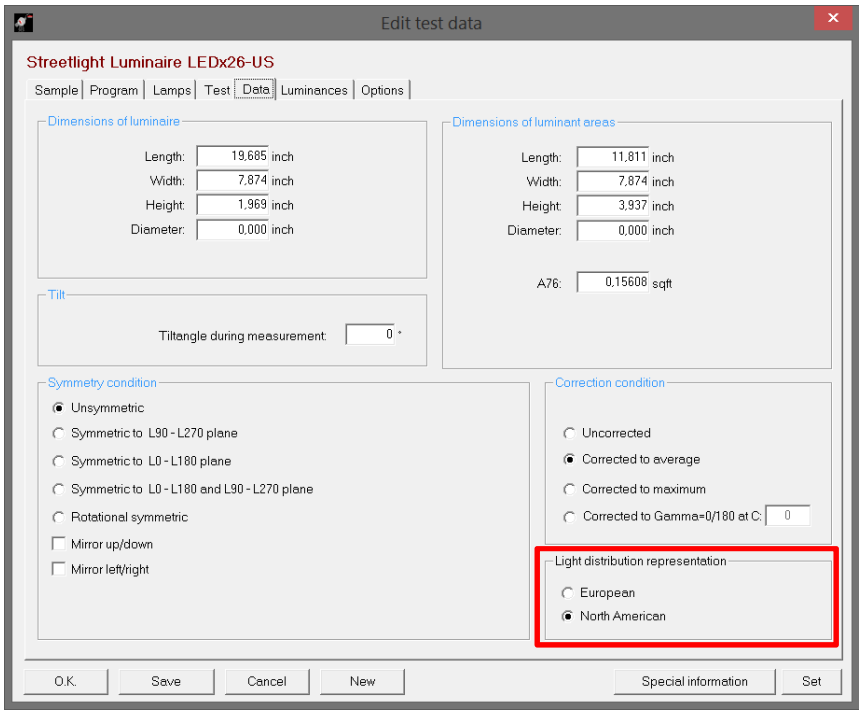


The information to be introduced is related to C-planes and not to L-planes. Therefore, it is necessary to adapt the information to the L-planes to be measured. The 2.5° spacing for -30°< L < 30° must be programmed with the 90° offset between L and C, e.g. for 60°< C < 120°.

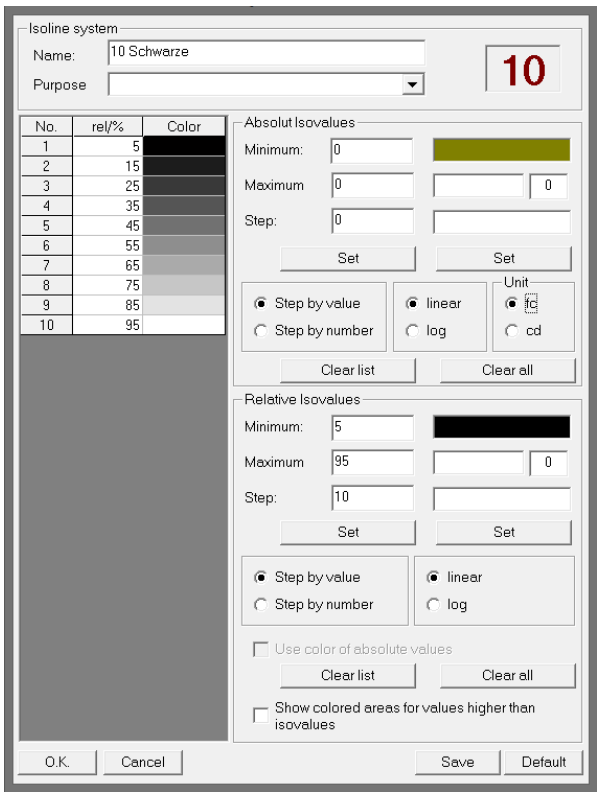
3.2 Software Settings

Finally, in the “data” tab of the “Edit test data” dialogue, the light distribution representation “North American” must be selected.

Once the test data have been assigned to North American convention, symmetry conditions will refer to L-planes (see chapter 5) and dimensions can be entered in inch and sqft.



Similarly, the unit for the absolute scale in isoline systems will be changed to foot-candle (see picture to the right) and dimensions in illuminance diagrams will be based on foot.

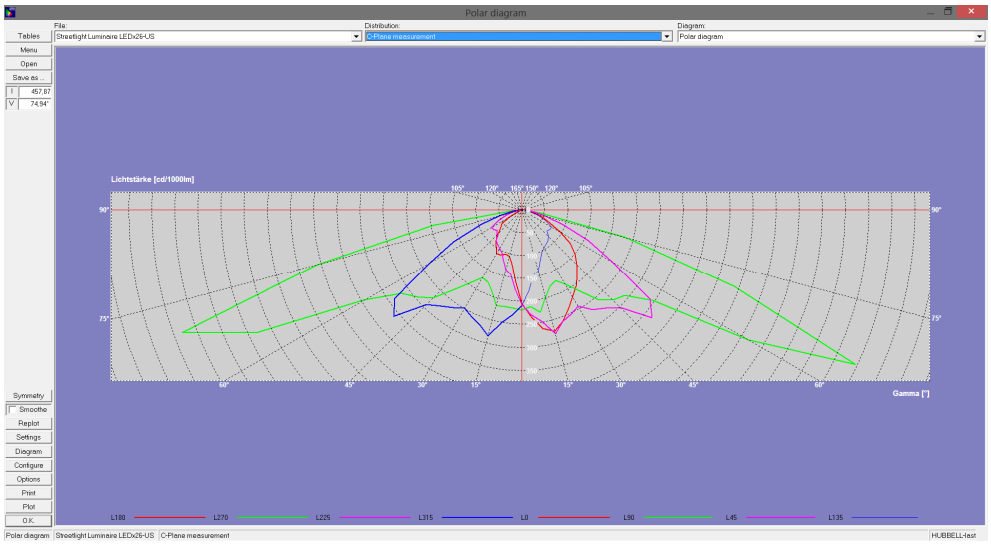


In order to evaluate and present data correctly, the following tables and graphics have been adjusted.

4 Data presentation

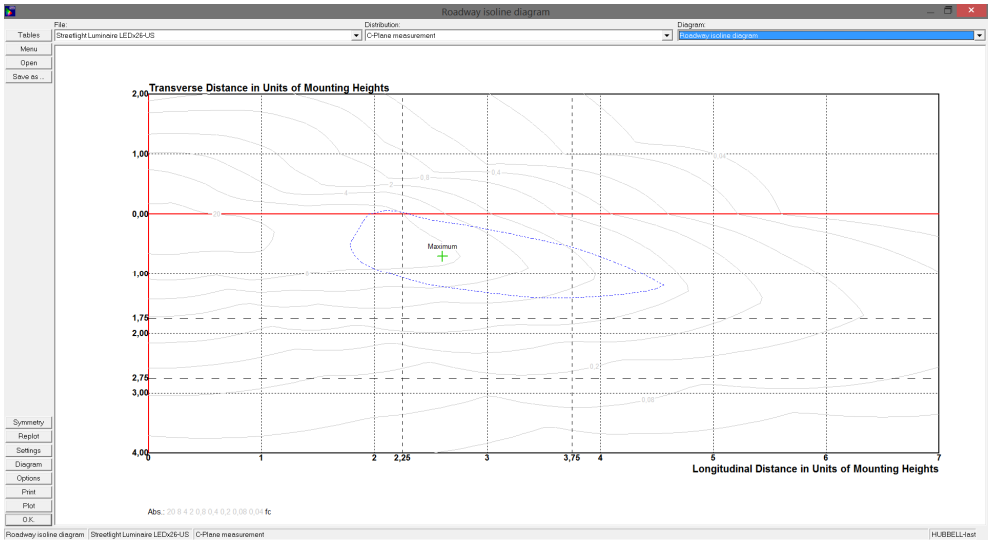
4.1 Polar diagram

A display of lateral planes and vertical angles is offered. The coordinate V is represented by γ, but instead of C-planes now the corresponding L-planes are shown.

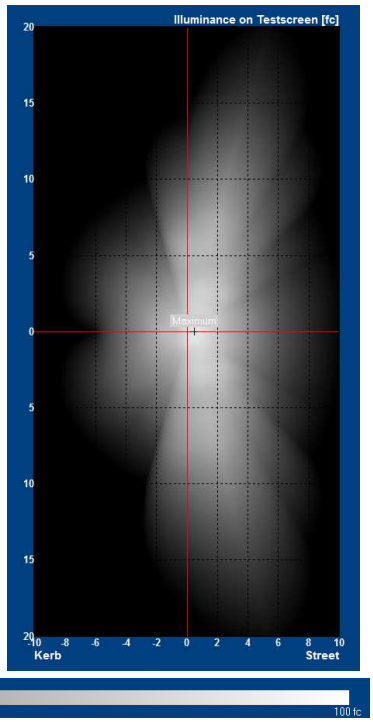


4.2 Roadway Isoline diagram

This evaluation is showing the projection of maximum candela point and half-maximum isocandela trace. Isolines are defined in foot-candle as explained in the entry to Chapter 3 and exemplarily shown below in the diagram's isoline legend.



Absolute illuminance may be scaled on a false colour scale in foot-candle as well. Dimension is changed from meter to foot.



4.3 Roadway classification

This evaluation presents a table with total and four quadrant efficiencies, peak intensity, efficacy, BUG ratings and roadway classification.

Show tables for Streetlight Luminaire LEDx26-US

Graphics | Save as ...

File: Streetlight Luminaire LEDx26-US

Table: Roadway Classification

Downward street side	1125,5 lm	75,8 %										
Downward home side	357,8 lm	24,1 %										
Downward total	1483,2 lm	99,9 %										
Upward street side	0,5 lm	0,0 %										
Upward house side	0,4 lm	0,0 %										
Upward total	0,9 lm	0,1 %										
Total flux	1484,1 lm	100,0 %										
Peak Intensity	2111,4 cd											
At L	75,0 °											
At V	70,0 °											
Total Power	21,634 W											
Efficacy	68,6 lm/W											
BUG ratings (acc. TM-15-11):	Asymmetrical luminaire											
	B0 U1 G1*											
	* UL estimated, rating U could be different due to limited range in V angles											
	FL	151,32 lm	BL	80,27 lm	UL	0,92 lm						
	FM	469,76 lm	BM	170,53 lm								
	FH	469,32 lm	BH	102,89 lm	UH	Not available						
	FVH	35,05 lm	BVH	4,07 lm								
Roadway Classification	Type II medium											

5 IES files with different symmetries

5.1 Software settings

Different “symmetry conditions” can be as well chosen in the “data” tab of the “Edit test data” dialogue.

ANSI/IESMA LM-63-02 does not consider symmetry with regard to the 90°–270° degree plane. Nevertheless, this symmetry option is offered in the Limes 2000 dialogue for the convenience of the user.

Once Symmetrisation has been performed in Limes 2000, saving into IES-format will therefore export all planes which have been created during symmetrisation.

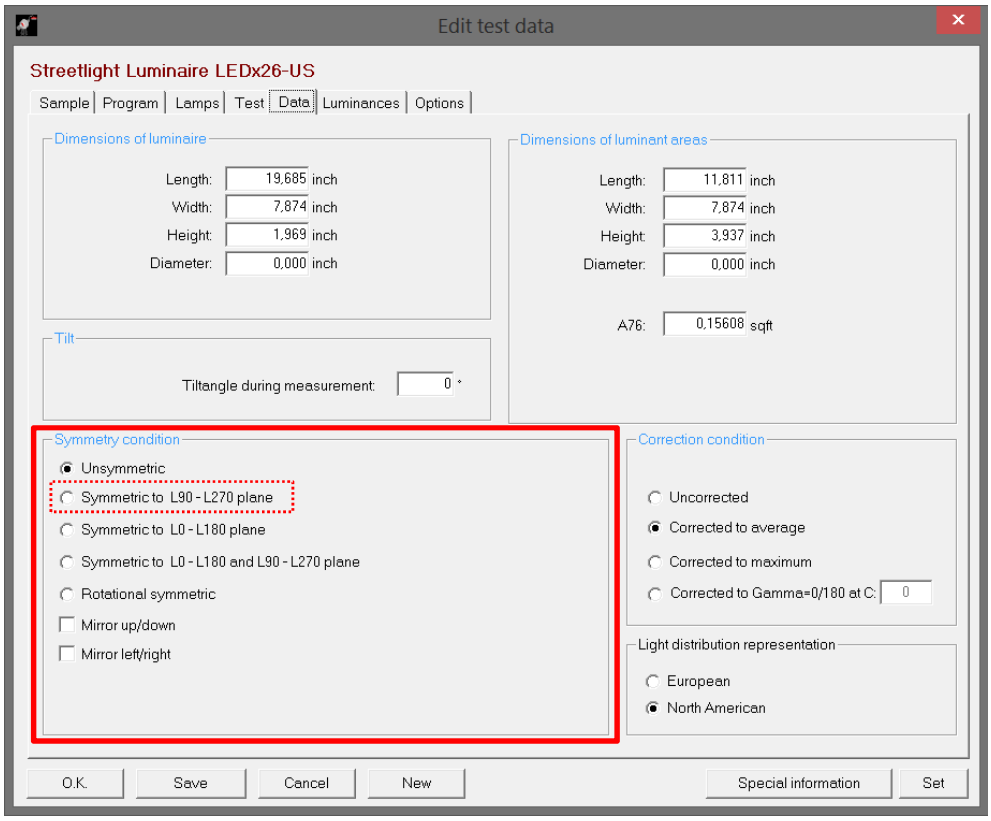
For Type C photometry, the first value shall always be 0 degrees, and the last value shall be one of the following:

1) 0 - in this case, there is only one horizontal angle, and the luminaire is assumed to be laterally symmetric in all planes.

2) 90 - the luminaire is assumed to be symmetric in each quadrant.

3) 180 - the luminaire is assumed to be symmetric about the 0 to 180 degree plane.

4) 360 - in this case, the luminaire is assumed to exhibit no lateral symmetry.



As outlined above does “Symmetric to L90-L270” not reflect a symmetry condition for IES LM 63, but is nevertheless offered as an option (see picture above).

6 Revision History

Date	Changes	Revision	Who
17.02.2017	Initial draft	0.9	Marcó
19.05.2017	Transfer to standard LMT template	1.0	Reiners

Specifications are subject to change without notice.