Info: European photometric testing conventions and compatibility with North American standards (IESNA)

Summary:

With the increasing availability of European manufactured luminaires in the North American market, it is essential that users of computation software understand possible differences in photometric testing conventions that can lead to incorrect application of European data (and vice versa).

More Information:

The main photometric data formats used in north America and Europe are:

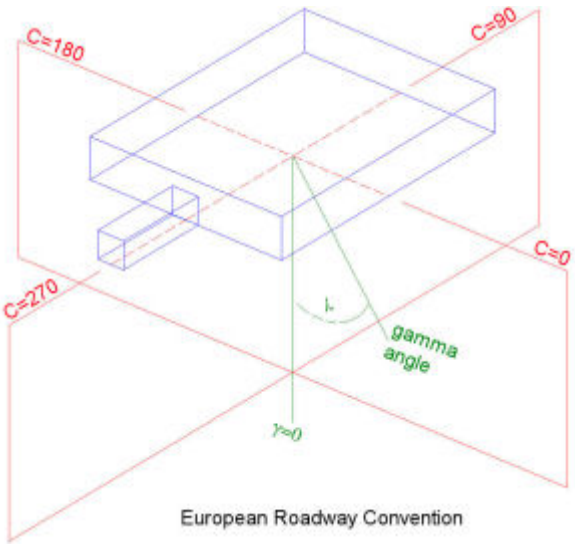
- CIBSE TM-14, (British) Standard File Format for the Electronic Transfer of Luminaire Photometric Data
- EULUMDAT Photometric Format, the de facto European standard (not officially documented)
- IESNA LM-63-02, the North American Standard File Format for the Electronic Transfer of Luminaire Photometric Data.

There are two conventions used in European testing procedures for Type 1 (IESNA Type C) that are typically different than their North American counterparts: the geometric convention for the testing of Roadway luminaires and the geometric convention for the testing of indoor luminaires. The second (indoor) convention can apply to a very diverse group of products and does not always come into conflict (more below). However, the differing convention for roadway luminaires is almost without exception. When speaking of roadway luminaires, it should be noted that this may encompass most pole mounted and exterior lluminaires, not simply those suited for roadways. Exceptions can exist, and there is no substitute for a close inspection of the data. Graphical representations such as those provided by the Photometric Toolbox software can be extremely valuable.

Roadway Conventions:

The European convention assumes the zero degree horizontal plane of photometric data (C=0) to be parallel to an imaginary curb line out the right side of the luminaire. Subsequent C-planes (horizontal angles in IESNA terms) are in counterclockwise rotation around the luminaire. Gamma angles are vertical displacements from Nadir (straight down) as measured in each C-plane. See Figure 1 below.

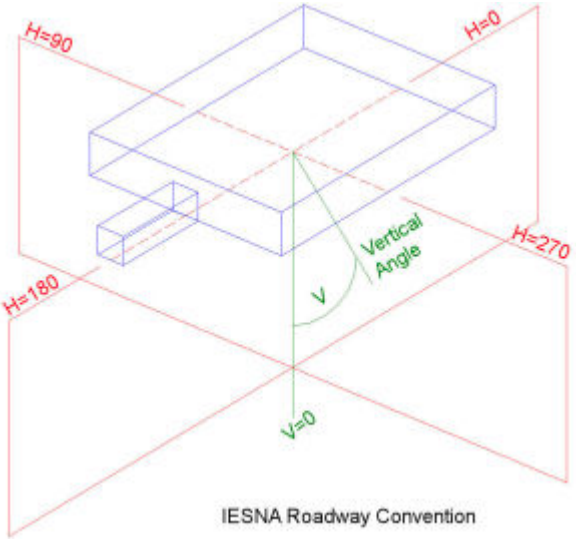
Figure 1 - European Roadway Luminaire Testing Convention



European Roadway Convention

The IESNA or North American convention places the zero degree horizontal plane of photometric data (H=0) perpendicular to the same imaginary curb line mentioned above, essentially defining the direction of the front of the luminaire. Vertical values are measured the same as gamma in European standard, from nadir to 180 degrees (straight down to straight up) in each H-plane. See Figure 2 below.

Figure 2 - IESNA Roadway Luminaire Testing Convention



IESNA Roadway Convention

Why is this a concern? The ninety degree difference between the location of the C=0 and H=0 planes in the two standards is problematic for most North American designers expecting IESNA standards. Software programs will align the zero degree plane (C=0 or H=0) identically in accordance with the programs' use of angular positioning (IESNA document LM-72). In the case of AGi32 using the CCE (counter clockwise east) angular positioning system, the C=0 and H=0 planes will both point East. However, the European standard luminaire will actually be facing North while the IESNA standard luminaire will face East. Software users expecting the European standard luminaire to point into the street will actually have the luminaire pointing along the curb line. If not detected, all computations will produce unexpected results.

The problem becomes worse should the user attempt to apply a Tilt or Roll angle to a luminaire tested with European convention. By definition in the CCE system, Tilt occurs in the H=0 plane. When applied in the C=0 plane, a Tilt value will actually Roll the luminaire (rotation about the opposite axis).

The calculation of various metrics common to outdoor lighting applications by North American standards are also misapplied for European road standard data by software such as Photometric Toolbox. The IESNA assumes street side angles to be 0-90 for bilateral symmetry, and if asymmetric, including 270-360 as well. The House Side of the light distribution is then from H=90 to H=270. For European standard road data, Street Side is C=0 to C=180 and House Side data is C=180 to C=360. You can imagine the variance of reported information when the luminaire is actually 90 degrees counter clockwise from what is expected.

Common logic would ask why doesn't the software just recognize the data and treat it appropriately? The answer is unfortunately not that simple. The problem lies in the fact that both roadway and indoor photometry are commonly reported in Type 1 (Euro) or Type C (IES) format. Therefore, there is no easy way to recognize one from the other.

This brings us to a brief discussion of indoor testing conventions. It is here that standards cease to be standards, or perhaps, given the diversity of today's luminaires, testing conventions have been modified to accommodate product application. By European standard (CIBSE TM-14), the C=0 plane is typically referenced across the short axis of the luminaire. This would be perpendicular to a typical four foot fluorescent lamp. This practice is found in some North American files as well, wall wash distributions for example. However, standard IESNA fluorescent testing convention places H=0 parallel to the lamp in a fluorescent with quadrilateral symmetry. The bottom line here is that European and North American standards may, or may not agree for indoor luminaires. There are no hard and fast rules to apply.

Solutions for North American software users: owning a license for Photometric Toolbox is almost a necessity. Using Photometric Toolbox you can examine the location of the C=0 plane in 3D or 2D to determine if the file requires manipulation. If the photometric file follows European standard roadway conventions, it can be rotated 270 degrees and saved in IESNA standard position. If applying the data in AGi32 without rotating as mentioned above, use the Photometric Web feature to assist in understanding the orientation of the light distribution and plan accordingly.

Applies To:

AGi32 - All versions

Toolbox - All versions

Link:
http://www.agi32.com/kb/index.php?article=884
