

OxyTech Software Validation

OxyTech guarantees that the software of entirely its own production called:

- ▶ LITESTAR 4D from version 6.00 onwards

has been developed according to the following International Recommendations and Standards:

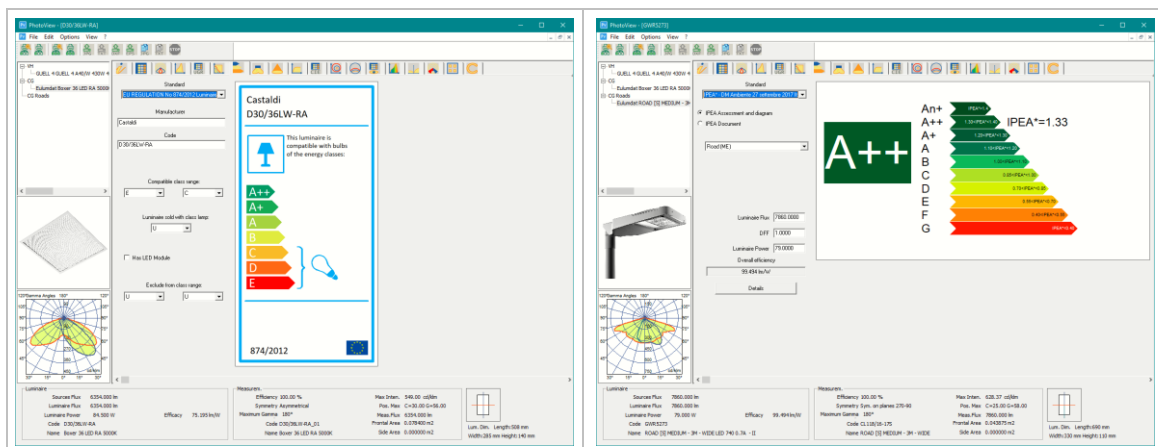
1 LITESTAR 4D Modules

LITESTAR 4D is a Software Suite for the lighting industry made up of the following modules:

	LITESTAR 4D Software Suite
	Photoview – Management of photometric and spectra data
	Lisdat – Management of catalog data
	Liswin – Catalog Browser
	Litecalc – Lighting Design
	Webcatalog – On-line catalog browser
	Gonwin – Program for the management of OxyTech goniophotometers

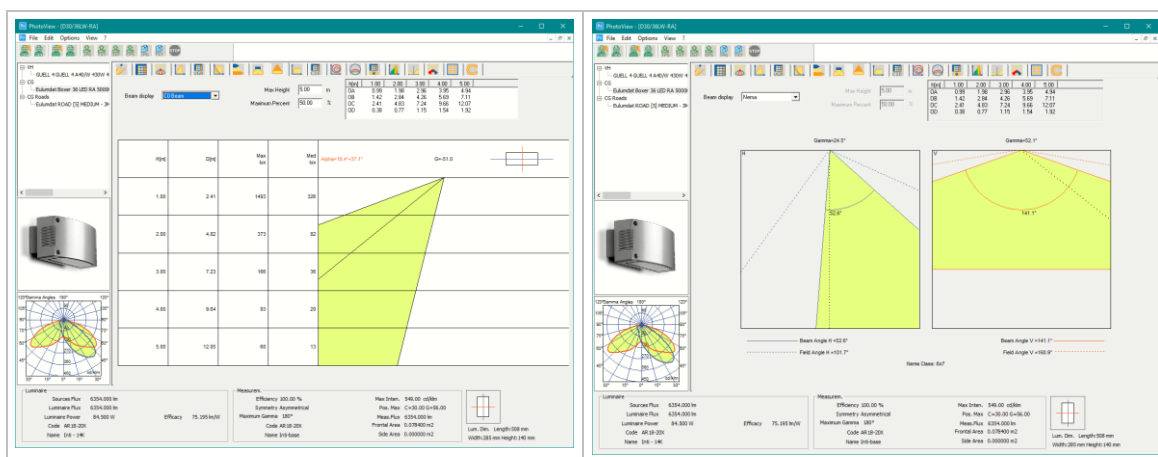
1.1.4 Energy Efficiency Assessment

► UE 874/2012	EU Regulation with regard to energy labelling of electrical lamps and luminaires
► CAM DM 2017-09-27	Criteri Ambientali Minimi per la Pubblica Illuminazione (Decree of the Italian Ministry for the Environment)



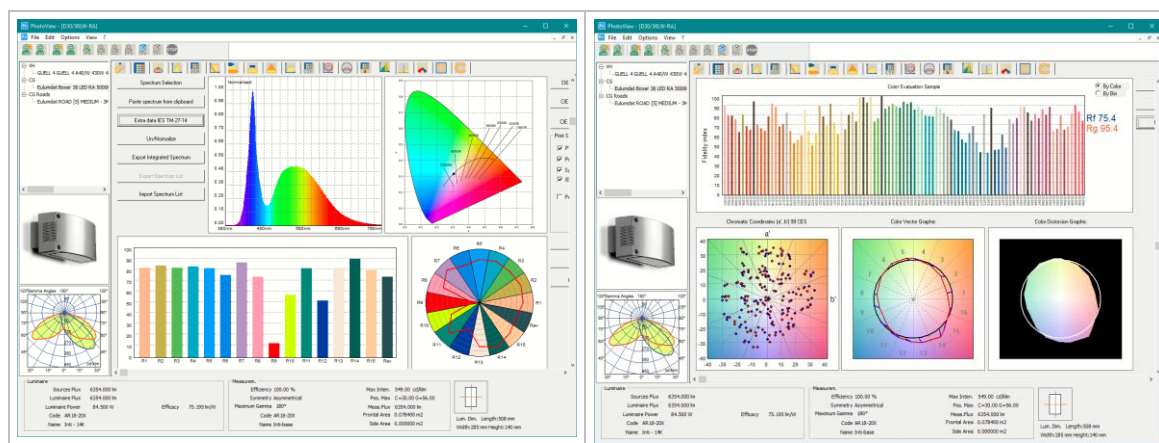
1.1.5 Beam Spread

► EN 13032-2:2017	Light and Lighting – Measurement and presentation of photometric data of lamps and luminaires Part 2: Presentation of data for indoor and outdoor work places
► ANSI C78-379-2006	Classification of the Beam Patterns for Reflector Lamps



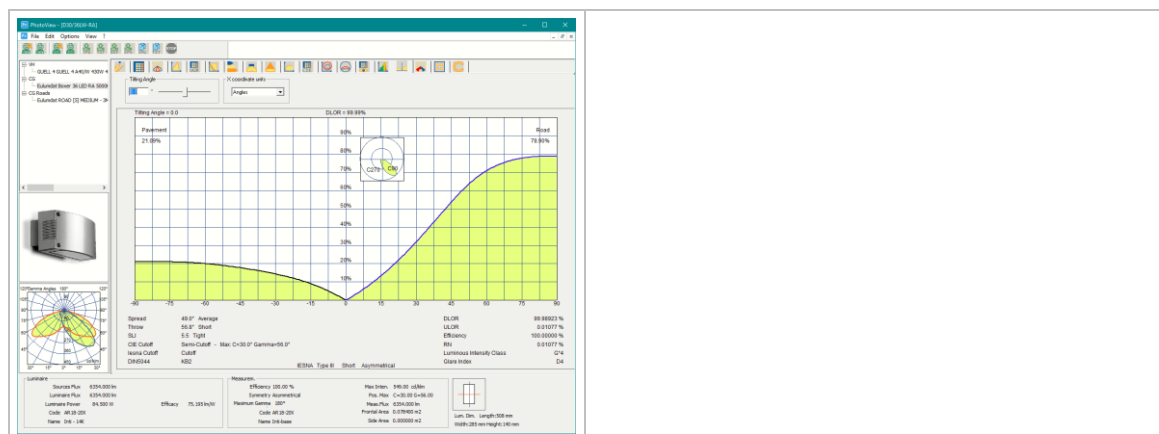
1.1.8 Spectra Management

► CIE 15:2004	Colorimetry
► IES TM-30-15	IES Method for Evaluating Light Source Color Rendition
► IES TM-30-18	IES Method for Evaluating Light Source Color Rendition - Corrigenda
► ANSI C78.376-2014	Specifications for the Chromaticity of Fluorescent Lamps



1.1.9 Classification of Road Lighting Luminaires – Efficiency Diagram

► EN 13201-2:2015	Road Lighting - Part 2: Performance Requirements
► EN 13201-3:2015	Road Lighting - Part 3: Calculation of Performance
► DIN 5044-2005	Ortsfeste Verkehrsbeleuchtung; Beleuchtung von Straßen für den Kraftfahrzeugverkehr [Removed on 2011] (German Standard)
► IES TM-3-95	Classification of Luminaire Light Distributions [Withdrawn]

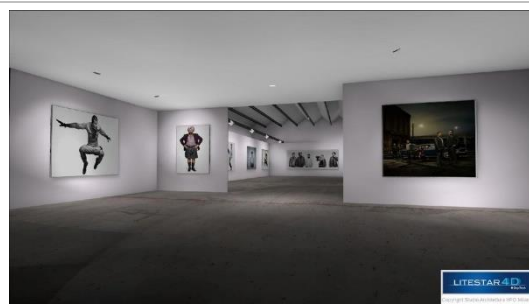
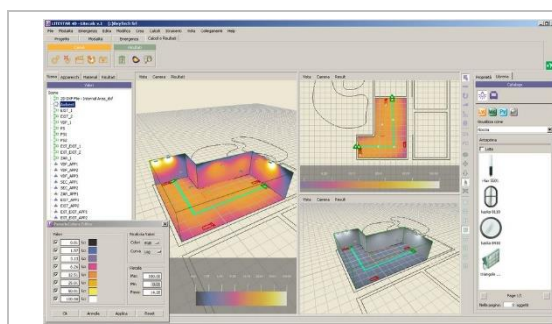




1.2 Litecalc – Progettazione Illuminotecnica

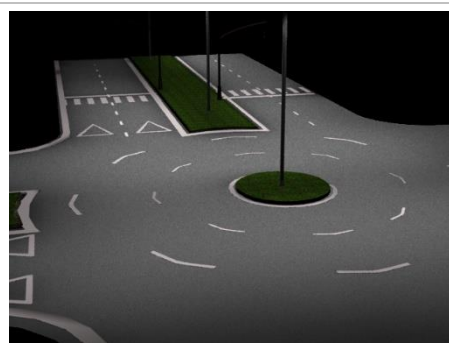
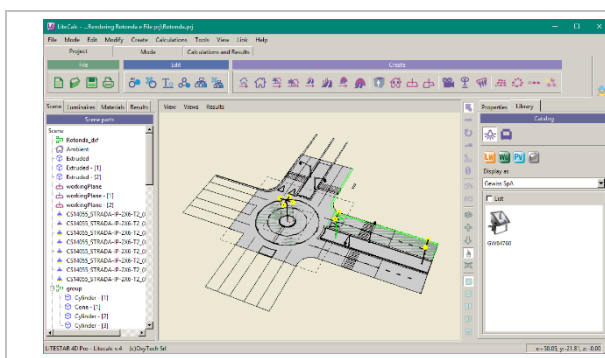
1.2.1 Lighting Calculation Module for Interiors – Litecalc

▶ CIE 24:1973	Photometry of indoor type luminaires with tubular fluorescent lamps
▶ CIE 40:1978	Calculation for interior lighting – Basic method (basic calculation)
▶ CIE 52:1982	Calculation for interior lighting – Applied method (advanced calculation)
▶ CIE 55:1983	Discomfort glare in the interior working environment (glare calculation)
▶ EN 12464-1:2011	Lighting of work places. Indoor work places



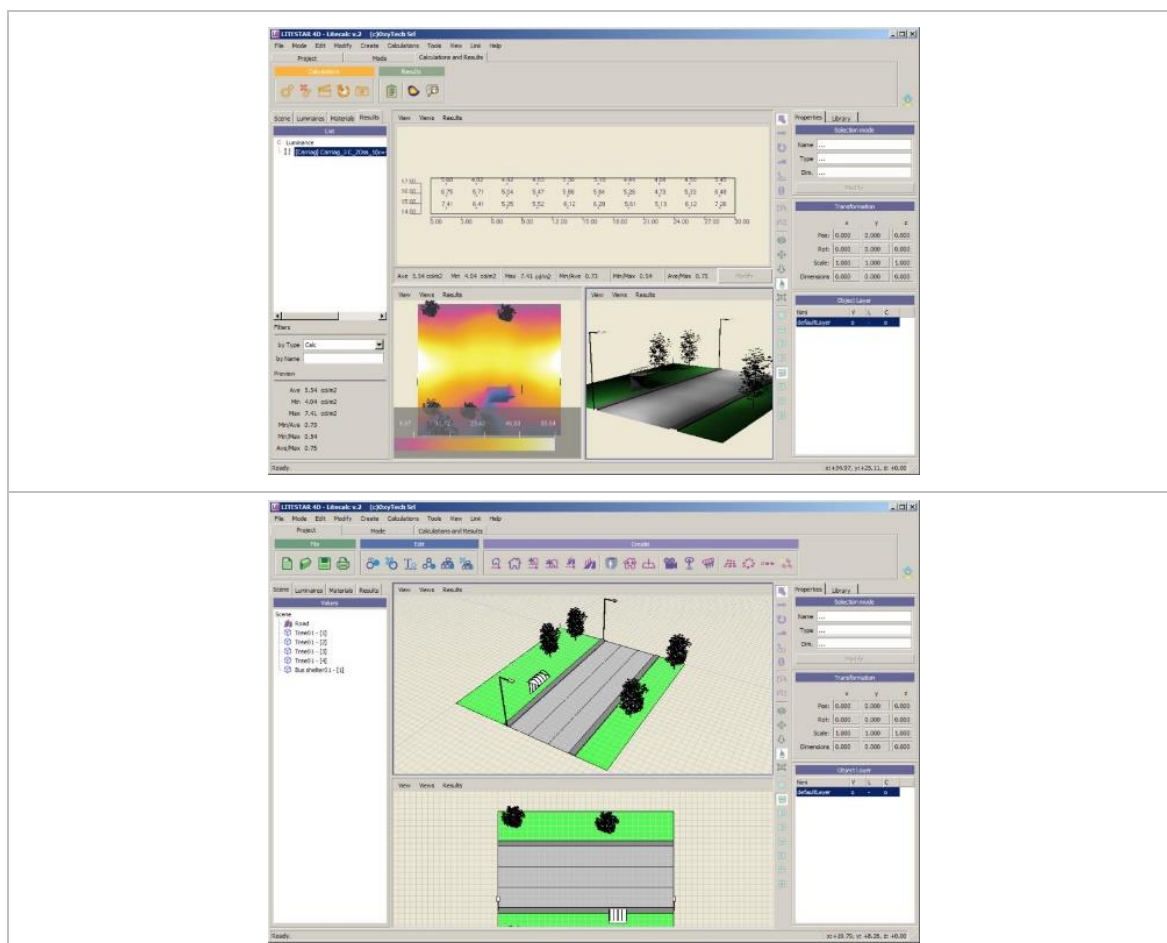
1.2.2 Lighting Calculation Module for Outdoor Areas - Litecalc

▶ CIE 43:1979	Photometry of floodlights
▶ EN 12464-2:2004	Lighting of work places. Outdoor work places



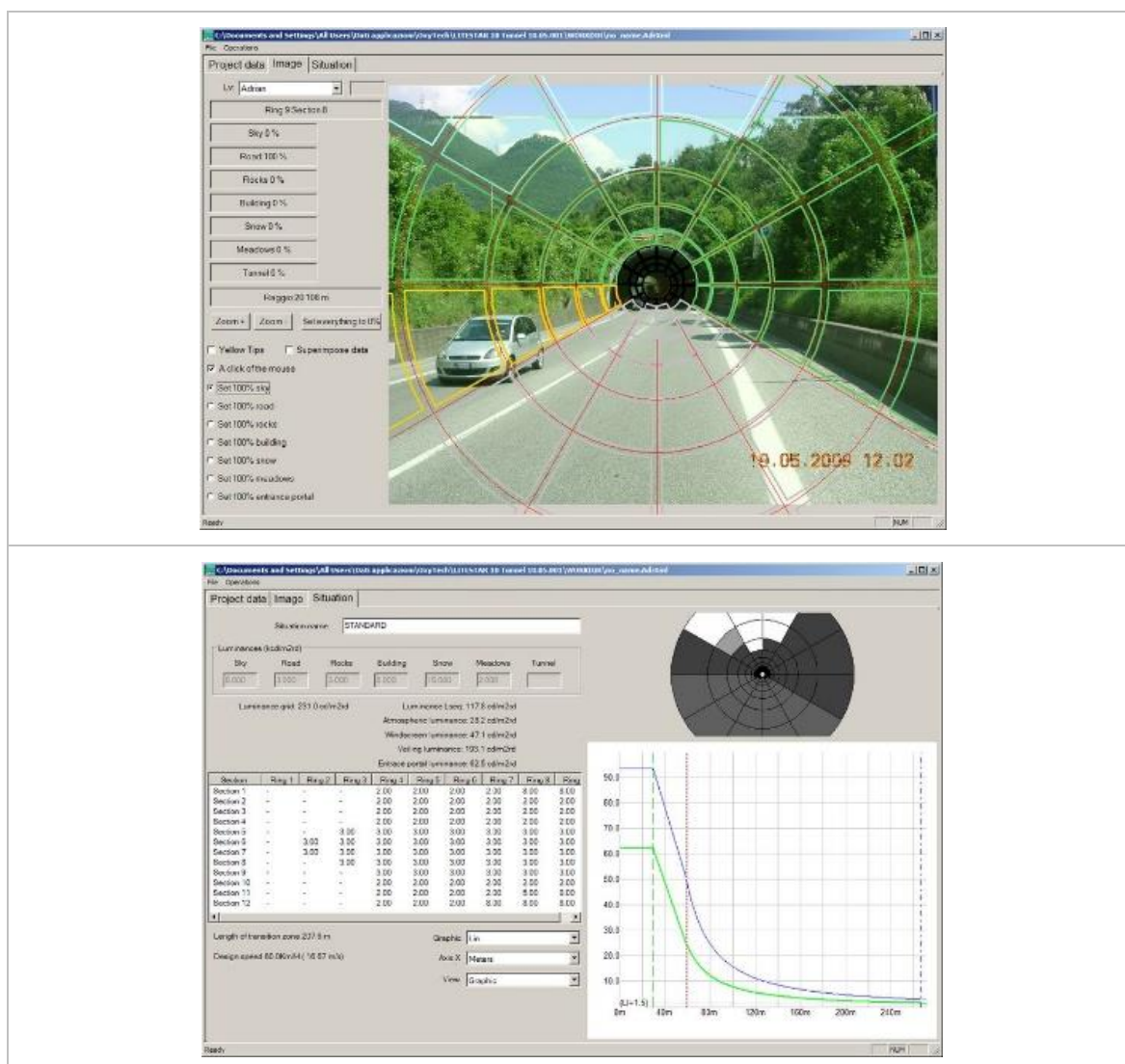
1.2.3 Lighting Calculation Module for Roads - Litecalc

► CIE 27:1973	Photometry of road lighting luminaires (photometric data table)
► CIE 30.2:1982	Road lighting calculations (Stan program)
► CIE 34:1977	Road lighting lantern and installation data: photometrics, classification and performance
► CIE 66:1984	Road surfaces and lighting (road surfaces determination)
► CIE 140:2000	Road Lighting Calculations
► D.M. 27/9/17	Criteri Ambientali Minimi per l'acquisizione di sorgenti luminose per illuminazione pubblica, l'acquisizione di apparecchi per illuminazione pubblica, l'affidamento del servizio di progettazione di impianti per illuminazione pubblica - aggiornamento 2017 (Decree of the Italian Ministry for the Environment)
► CEN/TR 13201-1:2014	Road Lighting – Part 1: Guidelines on selection of lighting classes
► EN 13201-2:2015	Road Lighting – Part 2: Performance requirements
► EN 13201-3:2015	Road Lighting – Part 3: Calculation of performance
► EN 13201-5:2015	Road Lighting – Part 5: Energy performance indicators
► R.D. 1890-2008 + R.D. 18-2022	Reglamento de eficiencia energética en instalaciones de alumbrado exterior y sus Instrucciones técnicas complementarias EA-01 a EA-07 (Spanish Standard)
► UNI 10819:1999	Inquinamento luminoso del cielo (Italian Standard)



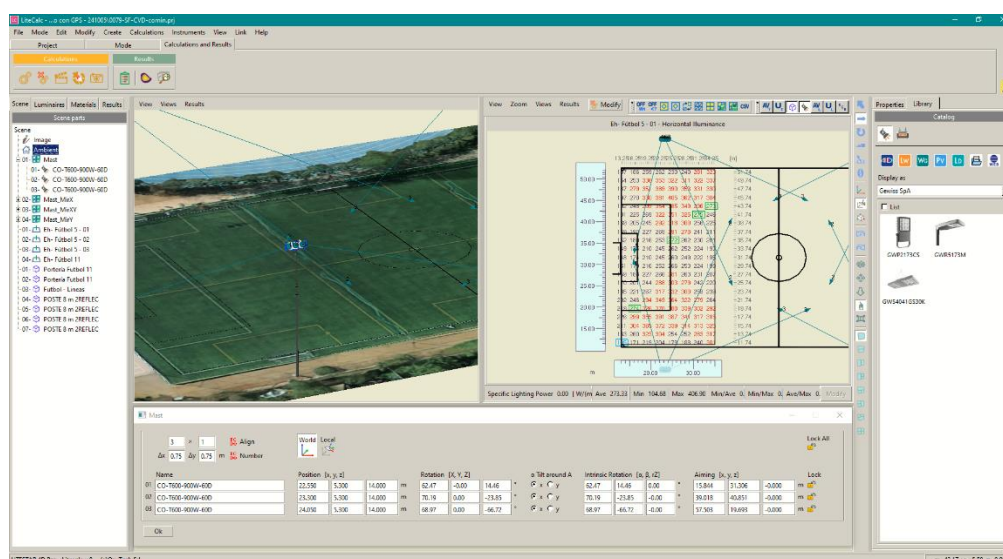
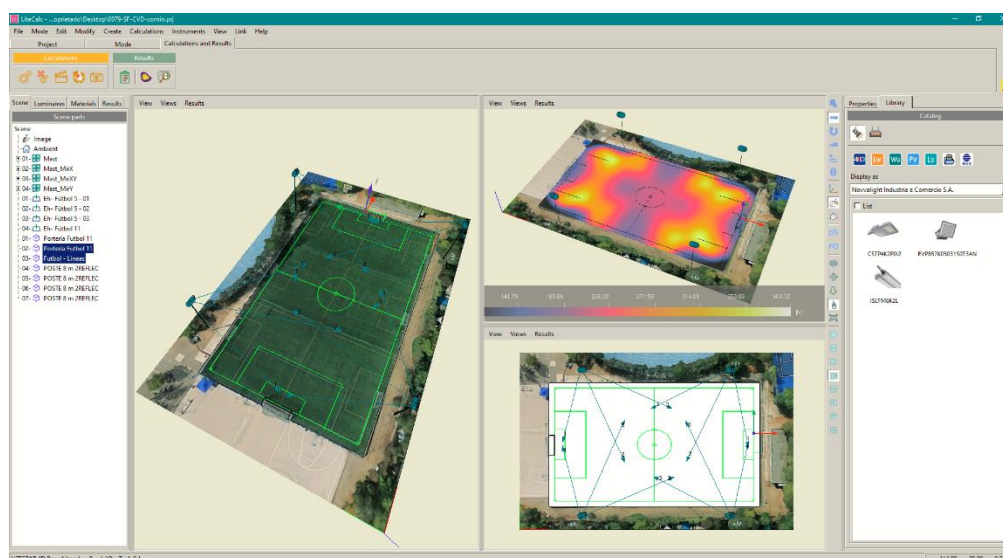
1.2.4 Lighting Calculation Module for Tunnels - Litecalc

► CIE 27:1973	Photometry of road lighting luminaires (photometric data table)
► CIE 30.2:1982	Road lighting calculations (Stan program)
► CIE 34:1977	Road lighting lantern and installation data: photometrics, classification and performance
► CIE 66:1984	Road surfaces and lighting (road surfaces determination)
► CIE 88:2004	Guide for the Lighting of Road Tunnels and Underpasses
► CIE 140:2000	Road lighting calculations
► EN 13201:2015	Road Lighting
► UNI 11095:2003	Illuminazione delle gallerie stradali (Italian Standard)
► UNI 11095:2011	Illuminazione delle gallerie stradali (Italian Standard)
► UNI 11095:2019	Illuminazione delle gallerie stradali (Italian Standard)
► UNI 11095:2021	Illuminazione delle gallerie stradali (Italian Standard)



1.2.5 Lighting Calculation Module for Sport Areas - Litecalc

► CIE 43:1979	Photometry of floodlights
► CIE 57:1983	Lighting for football
► CIE 83:1989	Guide for the lighting of sports events for colour television and film systems
► CIE 112:1994	Glare evaluation system for use within outdoor sports and area lighting
► FFF-2021	Normes pour l'éclairage des terrains et des installations sportives (French Standard)
► UNI 9316:1989	Sports lighting (Italian Standard)
► EN 12193:2018	Sports Lighting
► FIFA 2022	Lighting Design of Football Stadiums
► UEFA 2016	Stadium Lighting Guide



2 General

- ▶ IES LIGHTING GUIDE
- ▶ EN 13032 Measurement and presentation of photometric data of lamps and luminaires

3 Collaboration

The program has been developed with the collaboration of the following companies or corporations:

- ▶ Milan Polytechnic –Industrial Design Faculty – Light and Color Dept.: Rendering Module (from vers.6.00)

4 Field Tests

The program has been tested on the field by OxyTech on various occasions and have always found correspondence between the measured values and the calculated ones.

The program has also been tested by OxyTech customers, such as lighting manufacturers, public bodies, designers and specialized distributors for the past 20 years. During this period, the correspondence between the measured values and the calculated ones has always been confirmed, which guarantees the the validity of the calculation algorithms of the program.

Correspondence in comparisons between lighting engineering calculations and real cases is valid in the case of equal secondary parameters (voltage applied to the luminaires and their working temperature, surface reflectance values etc.): it is therefore advisable to consider a margin of error of $\pm 10\%$.

5 Comparative Tests with CIE Inspection Procedures

OxyTech has carried out comparative tests with the standard inspection procedure foreseen by CIE40-52 Recommendations finding perfect correspondence with forecast values.

This inspection has been carried out in parallelepiped shaped areas and has been taken as reference sample for the development of all successive modules.

Comparative tests have also been carried out on the roads module with the procedure foreseen by the STAN program of CIE30 Recommendations, finding, also in this case, perfect correspondence with forecast values.

6 Tests with Similar Software

OxyTech has over the years carried out comparative tests with similar software generally finding excellent correspondence with the values calculated with the various systems.

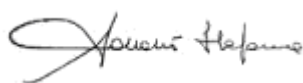
7 Quality System Iso 9001:2015

OxyTech has adopted the procedures of ISO 9001 Norm for the development of its software and the quality manual is fully operational. The manual is available to anyone who is interested.

The present Validation Declaration neither annuls nor limits the terms of the License Contract.

Cornaredo (Milan), November 8th 2024

OxyTech Srl



(Eng. Stefano Borsani)

(BoD President)