

PUBLICLY AVAILABLE SPECIFICATION



**Zhaga Interface Specification Book 20 including Book 1 – Smart interface
between indoor luminaires and sensing/communication modules**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.140.99

ISBN 978-2-8322-4877-5

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	11
INTRODUCTION.....	13
Section 1:	14
Zhaga Interface Specification Book 20	14
Summary (informative)	14
Background	14
Contents	14
Intended Use.....	14
1 General	15
1.1 Introduction.....	15
1.2 Scope	15
1.3 Conformance and references	15
1.3.1 Conformance	15
1.3.2 References	15
1.4 Definitions.....	16
1.5 Acronyms.....	17
1.6 Symbols.....	17
1.7 Conventions.....	17
1.7.1 Precedence	17
1.7.2 Cross references	17
1.7.3 Informative text.....	17
1.7.4 Terms in capitals	17
1.7.5 Units of physical quantities	17
1.7.6 Decimal separator	17
1.7.7 Limits	18
2 Overview (Informative)	18
2.1 General.....	18
2.2 Overview of the indoor connectivity system.....	18
2.3 Plug-and-play and Performance	19
2.4 Outline of this Book.....	19
Part 1: Interface Definition	20
3 Mechanical interface.....	21
3.1 Drawing principles	21
3.2 Mechanical references	21
3.3 Overview (informative)	21
3.4 Method used to specify the mechanical interface of the Luminaire and the LEX-M (informative).....	22
3.5 Mechanical interface of the Luminaire and LEX-M – Category R44x17	23
3.5.1 LEX-M demarcation model.....	23
3.5.2 Fixation of the LEX-M to the Luminaire	23
3.5.3 Luminaire	24
3.6 Mechanical interface of the Luminaire and LEX-M – category R60x22.....	25
3.6.1 LEX-M demarcation model.....	25
3.6.2 Fixation of the LEX-M to the Luminaire	26
3.6.3 Luminaire	26
3.7 Mechanical interface of the Luminaire and LEX-M – category C22-T1	28

3.7.1	LEX-M demarcation model.....	28
3.7.2	Fixation of the LEX-M to the Luminaire	29
3.7.3	Luminaire	29
3.8	Mechanical interface of the Luminaire and LEX-M – category C22-T2	30
3.8.1	LEX-M demarcation model.....	30
3.8.2	Fixation of the LEX-M to the Luminaire	31
3.8.3	Luminaire	31
3.9	Mechanical interface of the LEX-MR and LEX-LP.....	33
3.9.1	Overview (informative).....	33
3.9.2	LEX Module Receptacle (LEX-MR)	33
3.9.3	LEX Luminaire Plug (LEX-LP).....	36
4	Electrical & Communication Interface	38
4.1	Overview (Informative).....	38
4.2	Multiple LEX-Bs	39
4.3	General.....	39
4.4	Pin assignment at the Luminaire Extension Interface	39
4.5	Contact resistance of the LEX-LP	39
4.6	Electrical insulation at the Luminaire Extension Interface	39
4.6.1	Insulation requirements for the LEX-LP:.....	39
4.6.2	Insulation requirements for the LEX-M:	39
4.7	DALI communication & DALI bus power at the Luminaire Extension Interface	40
4.7.1	DALI communication & DALI bus power requirements for the LEX-LP	40
4.7.2	DALI communication & DALI bus power requirements for the LEX-M	40
Part 2:	Compliance Tests.....	41
5	Compliance test tools	42
5.1	GO-Gauge for the LEX-MR	42
5.1.1	Mechanical drawings of the GO-Gauge for LEX-MR.....	42
5.1.2	Material of the GO-Gauge for the LEX-MR.....	42
5.2	Contact making Gauge for the LEX-LP	43
5.2.1	Mechanical drawings of the Contact making Gauge for the LEX-LP	43
5.2.2	Material of the contact making Gauge for the LEX-LP.....	43
6	LEX Module Receptacle compliance tests.....	44
6.1	General.....	44
6.2	LEX Module Receptacle mechanical interface tests	44
6.2.1	Check compliance with section 3.9.2.1 (dimensions of mating area)	44
6.2.2	Check compliance with section 3.9.2.2 or 3.9.2.3 (demarcation model).....	45
6.2.3	Test of the LEX-MR un-mating force	45
6.2.4	Test of the LEX-MR – bending of the latch-on pin housing	46
6.2.5	Test of the LEX-MR contact plating.....	46
6.2.6	Test of the LEX-MR contact pins.....	47
7	LEX Luminaire Plug compliance tests	47
7.1	General.....	47
7.2	LEX Luminaire Plug mechanical interface tests	47
7.2.1	Check compliance with section 3.9.3.1 (dimensions of mating area)	47
7.2.2	Check compliance with section 3.9.3.2 (demarcation model)	48
7.2.3	Test of the LEX-LP contact plating.....	49
7.3	LEX Luminaire Plug electrical interface tests	49
7.3.1	Test contact resistance.....	49

8	LEX-M compliance tests	50
8.1	General.....	50
8.2	LEX-M mechanical interface tests	50
8.2.1	Test of the LEX-M demarcation.....	50
8.2.2	Test of the LEX-M fixation, detachment and dependency on mounting plate thickness.....	50
8.2.3	Test of the LEX-MR of the LEX-M under test	51
8.3	LEX-M electrical interface tests.....	51
8.3.1	General	51
8.3.2	Test of the LEX-M pin assignment	51
8.3.3	Test of the LEX-M DALI communication & DALI bus power requirements.....	51
9	Luminaire compliance tests	52
9.1	General.....	52
9.2	Luminaire mechanical interface tests	52
9.2.1	Test of the number of LEX-Ss	52
9.2.2	Test of the number of LEX-LPs	52
9.2.3	Test of the LEX-S	53
9.2.4	Test of the Luminaire demarcation.....	54
9.2.5	Test of the LEX-LP of the Luminaire under test.....	54
9.2.6	Test of the thickness of the mounting plate	55
9.3	Luminaire electrical interface tests	55
9.3.1	Test compliance with [D4i Requirements]	55
9.3.2	Test of the Luminaire pin assignment	55
9.3.3	Test of the Luminaire electrical insulation	56
9.3.4	Test of the Luminaire DALI communication & DALI bus power requirements	56
	Annexes	57
	Annex A Product Data Set requirements	58
A.1	LEX-M Product Data Set	58
A.2	Luminaire Product Data Set	58
	Section 2	59
	Zhaga Interface Specification Book 1	59
	Overview and Common Information	59
	Summary (informative)	59
	Background.....	59
	Contents	59
	Intended Use.....	59
1	General	60
1.1	Introduction.....	60
1.2	Scope	60
1.3	Conformance and references	60
1.3.1	Conformance	60
1.3.2	Normative references.....	60
1.3.3	Informative references	61
1.4	Common definitions	61
1.5	Common acronyms	63
1.6	Common symbols	63
1.7	Common conventions.....	64

1.7.1	Cross references	64
1.7.2	Informative text	64
1.7.3	Terms in capitals	64
1.7.4	Units of physical quantities	64
1.7.5	Decimal separator	64
2	Overview of Zhaga (informative)	64
2.1	About Zhaga	64
2.2	Zhaga building blocks and interfaces	65
2.3	Compatibility and Interchangeability	66
2.4	Product Data Set	67
2.5	Compliance testing	67
2.5.1	Certification	67
2.5.2	Market surveillance	68
2.6	Compatibility check	68
2.7	Zhaga product certification	69
3	Mechanical interface	69
3.1	Drawing principles	69
3.2	Mechanical interface between Separate ECG and Luminaire	69
3.3	Thermal expansion	69
3.4	Demarcation (Informative)	69
4	Photometric interface	70
4.1	Light Emitting Surface	70
4.1.1	LES categories	71
4.2	Operating conditions for measuring photometric parameters	71
4.3	Luminous flux	72
4.4	Luminous intensity distribution	72
4.4.1	Beam angle and beam angle categories	73
4.5	Luminance uniformity	73
4.6	Correlated color temperature (CCT)	73
4.7	Color rendering index (CRI)	73
4.8	Luminaire Optics (informative)	74
5	Electrical interface	74
5.1	Electrical insulation (informative)	74
6	Thermal interface	74
6.1	Background information (informative)	74
6.2	Generic thermal interface model	74
6.2.1	General case	74
6.2.2	Test Fixture TPTF	76
6.2.3	Rated Operating Temperature and safety (informative)	76
6.2.4	Thermal overload protection (Informative)	76
6.2.5	Ambient Temperature	77
6.2.6	Luminaires with multiple LLEs or multiple LED Modules	77
6.2.6.1	Separate heat sinks	77
6.2.6.2	One heat sink	77
6.2.7	Thermal compatibility check	77
6.2.8	Thermal uniformity	78
6.2.9	Thermal Interface Material	79
6.2.10	Surface planarity and roughness	79

6.2.11	Aging of LED Light Engine or LED Module/LED Array (informative).....	79
6.2.12	Empty	79
6.2.13	Ambient Temperature and thermal resistance (R_{th}).....	80
6.3	Simplified thermal interface model	80
6.3.1	General case	80
6.3.2	Rated Operating Temperature and safety (informative)	80
6.3.3	Thermal overload protection (informative)	80
6.3.5	Thermal Interface Material	81
6.3.6	Surface planarity and roughness.....	81
6.3.7	Aging of LED Light Engine or LED Module/LED Array (informative).....	81
7	Control interface	81
Annex A	Compliance tests	82
A.0	LED Module/LED Array compliance tests.....	82
A.0.1	LED Module/LED Array mechanical interface test	82
A.0.1.1	Test in the mechanical interface or the LED Module/LED Array.....	82
A.0.1.1.1	Test equipment.....	82
A.0.1.1.2	Test conditions	82
A.0.1.1.3	Test procedure	82
A.0.1.1.4	Pass criteria	82
A.0.2	LED Module/LED Array photometric interface tests	82
A.0.2.1	Test on Luminous Flux.....	82
A.0.2.1.1	Test equipment.....	82
A.0.2.1.2	Test conditions	82
A.0.2.1.3	Test procedure	82
A.0.2.1.4	Pass criteria	83
A.0.2.2	Test on Relative Partial Luminous Flux and beam angle.	83
A.0.2.2.1	Test equipment.....	83
A.0.2.2.2	Test conditions	83
A.0.2.2.3	Test procedure	83
A.0.2.2.4	Pass criteria	83
A.0.2.3	Test on correlated color temperature (CCT)	83
A.0.2.3.1	Test equipment.....	83
A.0.2.3.2	Test conditions	84
A.0.2.3.3	Test procedure	84
A.0.2.3.4	Pass criteria	84
A.0.2.4	Test on color rendering index.....	84
A.0.2.4.1	Test equipment.....	84
A.0.2.4.2	Test conditions	84
A.0.2.4.3	Test procedure	84
A.0.2.4.4	Pass criteria	84
A.0.2.5	Test on Luminance Uniformity.....	84
A.0.3	LED Module/LED Array thermal interface tests.....	85
A.0.3.1	Test on thermal power (P_{th}).....	85
A.0.3.1.1	Test equipment.....	85
A.0.3.1.2	Test conditions	85
A.0.3.1.3	Test procedure	85
A.0.3.1.4	Pass criteria	85
A.0.4	LED Module/LED Array electrical interface tests	85
A.0.5	LED Module/LED Array Product Data Set test.....	85

A.0.5.1 Test	85
A.0.5.2 Pass criteria	85
A.1 LLE compliance tests	85
A.1.1 LLE mechanical interface tests	85
A.1.1.1 Test of the mechanical interface of the Integrated LLE	86
A.1.1.1.1 Test equipment	86
A.1.1.1.2 Test conditions	86
A.1.1.1.3 Test procedure	86
A.1.1.1.4 Pass criteria	86
A.1.2 LLE photometric interface tests	86
A.1.2.1 Test on Luminous Flux	86
A.1.2.1.1 Test equipment	86
A.1.2.1.2 Test conditions	86
A.1.2.1.3 Test procedure	86
A.1.2.1.4 Pass criteria	86
A.1.2.2 Test on Relative Partial Luminous Flux and beam angle.	86
A.1.2.2.1 Test equipment	87
A.1.2.2.2 Test conditions	87
A.1.2.2.3 Test procedure	87
A.1.2.2.4 Pass criteria	87
A.1.2.3 Test on correlated color temperature (CCT)	87
A.1.2.3.1 Test equipment	87
A.1.2.3.2 Test conditions	87
A.1.2.3.3 Test procedure	88
A.1.2.3.4 Pass criteria	88
A.1.2.4 Test on color rendering index	88
A.1.2.4.1 Test equipment	88
A.1.2.4.2 Test conditions	88
A.1.2.4.3 Test procedure	88
A.1.2.4.4 Pass criteria	88
A.1.2.5 Test on Luminance Uniformity	89
A.1.3 LLE thermal interface tests	89
A.1.3.1 Test on thermal power (P_{th})	89
A.1.3.1.1 Test equipment	89
A.1.3.1.2 Test conditions	89
A.1.3.1.3 Test procedure	89
A.1.3.1.4 Pass criteria	89
A.1.3.2 Test on Thermal power through the Thermal Interface Surface ($P_{th, rear}$)	89
A.1.3.2.1 Test equipment	89
A.1.3.2.2 Test conditions	90
A.1.3.2.3 Calibration of $P_{th, rear}$ test setup	90
A.1.3.2.4 Measurement of $P_{th, rear}$ of the LLE	92
A.1.3.2.5 Pass criteria	92
A.1.3.3 Empty	92
A.1.3.4 Empty	92
A.1.3.5 Temperature stabilization	92
A.1.3.6 Position of measurement point for the temperature t_r	93
A.1.4 LLE electrical interface tests	93
A.1.5 LLE control interface tests	93

A.1.6 LLE Product Data Set test.....	93
A.1.6.1 Test	93
A.1.6.2 Pass criteria	93
A.2 Luminaire compliance tests	93
A.2.1 Luminaire mechanical interface tests	93
A.2.1.1 Test of the mechanical dimensions of the Luminaire.....	93
A.2.1.1.1 Test equipment	93
A.2.1.1.2 Test conditions	93
A.2.1.1.3 Test procedure	93
A.2.1.1.4 Pass criteria	94
A.2.2 Luminaire photometric interface tests	94
A.2.3 Luminaire thermal interface tests	94
A.2.3.1 Empty	94
A.2.4 Luminaire electrical interface tests	94
A.2.5 Luminaire control interface tests	94
A.2.6 Luminaire Product Data Set test.....	94
A.2.6.1 Test	94
A.2.6.2 Pass criteria	94
Annex B Guidelines for Demarcation measurement	95
Annex C History of changes	97

Figure 2-1 – Schematic overview of a typical Book 20 Luminaire and a Luminaire Extension Module	18
Figure 3-1 – Positions of the reference point, the reference plane and the reference axes of the LEX-S and LEX-M for circular and rectangular formfactors	21
Figure 3-2 – Method of specification of the mechanical interface of the Luminaire and the LEX-M.....	22
Figure 3-3 – Demarcation model for the LEX-M – category R44x17	23
Figure 3-4 – Dimensions of the LEX-S– category R44x17	24
Figure 3-5 – Border of the LEX-S – category R44x17	25
Figure 3-6 – Demarcation model for the LEX-M – category R60x22	26
Figure 3-7 – Dimensions of the LEX-S– category R60x22	27
Figure 3-8 – Border of the LEX-S – category R60x22.....	27
Figure 3-9 – Demarcation model for the LEX-M – category C22-T1	28
Figure 3-10 – Dimensions of the LEX-S– category C22-T1.....	29
Figure 3-11 – Border of the LEX-S – category C22-T1	30
Figure 3-12 – Demarcation model for the LEX-M – category C22-T2	31
Figure 3-13 – Dimensions of the LEX-S– category C22-T2.....	32
Figure 3-14 – Border of the LEX-S – category C22-T2	32
Figure 3-15 – Internal border of the LEX-S – category C22-T2.....	33
Figure 3-16 – Supported configurations and scope of the specification	33
Figure 3-17 – Examples of the wire-to-wire LEX-MR and the wire-to-board LEX-MR (informative)	34
Figure 3-18 – Mechanical interface of the mating area of the LEX-MR	34
Figure 3-19 – Mechanical interface of the mating area of the LEX-MR – cross section A-A	34

Figure 3-20 – Demarcation model of the LEX-MR (top view and side view) – wire-to-wire type	35
Figure 3-21 – Demarcation model of the LEX-MR (top view and side view) – wire-to-board type	36
Figure 3-22 – Examples of a LEX-LP (informative).....	36
Figure 3-23 – Mechanical interface of the mating area of the LEX-LP	37
Figure 3-24 – Mechanical interface of the mating area of the LEX-LP – cross section A-A.....	37
Figure 3-25 – Demarcation model of the LEX-LP (top view and side view)	38
Figure 4-1 – Overview of the LEX-M and the Luminaire with LEX-LP	38
Figure 5-1 – Mechanical interface of the mating area of the LEX-MR GO-Gauge	42
Figure 5-2 – Mechanical interface of the mating area of the LEX-MR GO-Gauge – cross section A-A.....	42
Figure 5-3 – Mechanical interface of the mating area of the LEX-LP GO-Gauge	43
Figure 5-4 – Mechanical interface of the mating area of the LEX-LP GO-Gauge – cross section A-A.....	43
Figure 2-1 – Schematic overview of a Luminaire and one or more non-integrated LED Light Engines.....	65
Figure 2-2 – Schematic overview of a Luminaire and one or more integrated LED Light Engines	65
Figure 2-3 – Schematic overview of a LED Light Engine with Integrated ECG	66
Figure 2-4 – Schematic overview of a LED Light Engine with Separate ECG.....	66
Figure 2-5 – Overview of test and certification of Zhaga products	68
Figure 2-6 – Compatibility check.....	68
Figure 3-1 – Example of a Demarcation Model (2-dimensional).....	69
Figure 3-2 – Example of a product which is compliant with the Demarcation Model.....	70
Figure 3-3 – Example of a product which is not compliant with the Demarcation Model.....	70
Figure 3-4 – Example of a product which is not compliant with the Demarcation Model.....	70
Figure 4-1 – Rotationally symmetric solid angle bounded by the polar angles γ_1 and γ_2 which is used to define the Relative Partial Luminous Flux.....	73
Figure 6-1 – Thermal model of a LLE – Luminaire or a LED Module – Luminaire combination	75
Figure 6-2 – Power conversion	75
Figure 6-3 – Position of the Thermal Interface Surface in case of a configuration with TIM	79
Figure A-1 – Heat sensor equipment with Test Fixture and LLE-under-test	90
Figure A-2 – Calibration of the heat flux measurement setup	91
Figure A-3 – Position of measurement point for the temperature t_r	93
Figure B-1 – Example of a LED Array	95
Figure B-2 – Example of a LED Array with sections	95
Figure B-3 – Example of a LED Array with measurement points.....	96
Table 4-1 – Assignments of contacts in the LEX-MR and in the LEX-LP.....	39
Table 6-1 – Dimension of the LEX-MR defined in Figure 3-18 and Figure 3-19.....	45
Table 6-2 – Pass criteria for percentage mass of several elements in the contact plating	47

Table 7-1 – Dimension of the LEX-LP defined in Figure 3-23 and Figure 3-24.....	48
Table 7-2 – Pass criteria for percentage mass of several elements in the contact plating	49
Table 9-1 – Dimensions of the LEX-S for category R44x17 defined in Figure 3-4 and Figure 3-5.....	53
Table 9-2 – Dimensions of the LEX-S for category R60x22 defined in Figure 3-7 and Figure 3-8.....	53
Table 9-3 – Dimensions of the LEX-S for category C22-T1 defined in Figure 3-10 and Figure 3-11	54
Table 9-4 – Dimensions of the LEX-S for cat. C22-T2 defined in Figure 3-13, Figure 3-14 and Figure 3-15	54
Table 4-1 – Definition of circular LES categories.....	71
Table 4-2 – Test voltages for different Rated input voltages of the LLE.....	72
Table 4-3 – Definition of beam angle categories	73
Table C-1 – Changes from Edition 1.8 to Edition 1.9.....	97

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ZHAGA INTERFACE SPECIFICATION BOOK 20 INCLUDING BOOK 1 – SMART INTERFACE BETWEEN INDOOR LUMINAIRES AND SENSING/COMMUNICATION MODULES

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

A PAS is an intermediate specification made available to the public and needing a lower level of consensus than an International Standard to be approved by vote (simple majority).

IEC PAS 63422 has been processed by IEC technical committee 34: Lighting.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
34/891/DPAS	34/901/RVDPAS

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned may transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of 2 years starting from the publication date. The validity may be extended for a single period up to a maximum of 2 years, at the end of which it shall be published as another type of normative document, or shall be withdrawn.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This PAS is a reproduction of Zhaga Book 1 Edition 1.9 and Book 20 Edition 1.0 with no change introduced.

The document layout, terms, and definitions, etc within this PAS therefore do not follow the IEC drafting rules that would be applied for an International Standard.

Section 1 comprises Zhaga Book 20 Edition 1.0 – Smart interface between indoor luminaires and sensing/communication modules.

Section 2 comprises Zhaga Book 1 Edition 1.9 – Overview and common information.

Zhaga Book 1 is essential to the interpretation of Zhaga Book 20 (and other Zhaga books).

The intention is for the content of this PAS to be incorporated within one or more International Standards following the IEC Directives and drafting rules.

Section 1:

Zhaga Interface Specification Book 20

Summary (informative)

Background

Zhaga is a global association of lighting companies that is standardizing interfaces of components of LED luminaires, including LED light engines, LED modules, LED arrays, holders, electronic control gears (LED drivers), sensors, communication modules and connectivity fit systems. This helps to streamline the LED lighting supply chain, and to simplify LED luminaire design and manufacturing. Zhaga continues to develop specifications based on the inter-related themes of interoperable components, smart and connected lighting, and serviceable luminaires.

Contents

Book 20 defines a smart interface between an indoor LED luminaire and a sensing/communication module. The module connects to the LED driver and control system, and typically can provide sensory inputs or enable communication between network components. Modules can be installed and replaced in the field.

Key benefits are provided for

- luminaire makers, as certified sensors from multiple suppliers are available with a range of different functions
- installers, as certification on interoperability of components exists
- end-users, as the luminaire can be adapted with modules for different functions, like air quality, presence detection, light levels etc.

This Book should be read together with Zhaga Book 1.

Intended Use

The luminaire extension module defined in this Book 20 is intended to be installed and replaced by professionals and non-professionals.

1 General

1.1 Introduction

Zhaga is a global association of lighting companies that is standardizing interfaces of components of LED luminaires, including LED light engines, LED modules, LED arrays, holders, electronic control gears (LED drivers), sensors, communication modules and connectivity fit systems. This helps to streamline the LED lighting supply chain, and to simplify LED luminaire design and manufacturing. Zhaga continues to develop specifications, called books, based on the inter-related themes of interoperable components, smart and connected lighting, and serviceable luminaires.

Book 1 is a special Book in the sense that it provides common information, which is relevant to all other Books in the series. In addition, Book 1 defines requirements and compliance tests, which are applicable across multiple Zhaga books. Such Books refer to those requirements and compliance tests as applicable.

1.2 Scope

Book 20 defines a smart interface between an indoor LED luminaire and a sensing/communication module. The module connects to the LED driver and control system, and typically can provide sensory inputs or enable communication between network components. Modules can be installed and replaced in the field.

1.3 Conformance and references

1.3.1 Conformance

All provisions in the Zhaga interface Specifications are mandatory, unless specifically indicated as recommended, optional or informative. Verbal expressions of provisions in the Zhaga interface specifications follow the rules provided in ISO/IEC Directives, Part 2. For clarity, the word "shall" indicates a requirement that is to be followed strictly in order to conform to the Zhaga interface specifications, and from which no deviation is permitted. The word "should" indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

1.3.2 References

For references that are not listed in this section, see [Book 1]. For undated references, the most recently published edition applies.

[Book 1]	Zhaga Interface Specification, Book 1: Overview and Common Information.
[DALI – Part 101]	IEC 62386-101:2014, Digital addressable lighting interface – Part 101: General requirements – System components, Edition 2.0, 2014-11.
[DALI – Part 102]	IEC 62386-102:2014, Digital addressable lighting interface – Part 102: General requirements – Control gear, Edition 2.0, 2014-11.
[DALI – Part 103]	IEC 62386-103:2014, Digital addressable lighting interface – Part 103: General requirements – Control devices, Edition 2.0, 2014-11.
[DALI – Part 207]	IEC 62386-207, Digital addressable lighting interface – Part 207: Particular requirements for control gear – LED modules (device type 6).
[DALI – Part 250]	DiiA specification – DALI Part 250 – Integrated Bus Power Supply, Device Type 49, Version 1.1, October 2019.
[DALI – Part 251]	DiiA specification – DALI Part 251 – Memory bank 1 extension, Device Type 50, Version 1.1, October 2019.
[DALI – Part 252]	DiiA specification – DALI Part 252 – Energy reporting, Device Type 51, Version 1.1, October 2019.
[DALI – Part 253]	DiiA specification – DALI Part 253 – Diagnostics & Maintenance, Device Type 52, Version 1.1, October 2019.
[DALI – Part 351]	DiiA specification – DALI Part 351 – Luminaire-mounted Control Devices, Version 1.0, October 2019.
[D4i Requirements]	DiiA Requirements – D4i Certification and Trademark use, Version 1.0, October 2019.
[DiiA Database]	https://www.digitalilluminationinterface.org/products
[LoC-Luminaire]	Template for letter of confirmation for Book-20 Luminaires, published on the Zhaga website.
[LoC-LEX-M]	Template for letter of confirmation for Book-20 LEX-Ms, published on the Zhaga website.
[IEC 60598-1]	IEC 60598-1, Luminaires – Part 1: General requirements and tests.
[IEC 60529]	IEC 60529, Degrees of protection provided by enclosures.
[LoC-LEX-LP]	Template for Letter of confirmation for Book-20 LEX-LP, published on the Zhaga website.
[LoC-LEX-MR]	Template for Letter of confirmation for Book-20 LEX-MR, published on the Zhaga website.