

# PUBLICLY AVAILABLE SPECIFICATION



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



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2022 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

#### IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

#### IEC Products & Services Portal - [products.iec.ch](http://products.iec.ch)

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Preview generated by EVS

# 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 978-2-8322-1093-3

**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
	<b>Section 2</b> .....	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
<b>Annex A</b>	<b>Compliance tests</b>	<b>82</b>
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 $\gamma_1$ and $\gamma_2$ 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

This document is a preview generated by EVS

## 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.**

This document is a preview generated by EVS

## 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.