

AS/NZS 62386.209:2020



Australian/New Zealand Standard™

Digital addressable lighting interface

**Part 209: Particular requirements for control gear — Colour control
(device type 8) (IEC 62386-209:2011 (ED. 1.0) MOD)**



AS/NZS 62386.209:2020

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee EL-041, Lamps and Related Equipment. It was approved on behalf of the Council of Standards Australia on 4 November 2020 and by the New Zealand Standards Approval Board on 4 November 2020.

This Standard was published on 20 November 2020.

The following are represented on Committee EL-041:

- Australian Industry Group
- Better Regulation Division
- CHOICE
- Consumer Electronics Suppliers Association
- Consumers' Federation of Australia
- Department of Industry, Science, Energy and Resources
- Electrical Compliance Testing Association of Australia
- Electrical Regulatory Authorities Council
- Energy Efficiency & Conservation Authority of New Zealand
- IES: The Lighting Society
- Joint Accreditation System of Australia and New Zealand
- Joint Accreditation System of Australia and New Zealand — New Zealand
- Lighting Council Australia
- Lighting Council New Zealand
- Master Electricians Australia
- Master Electricians NZ
- WorkSafe New Zealand

This Standard was issued in draft form for comment as DR AS/NZS 62386.209:2020.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

www.standards.govt.nz

ISBN 978 1 76113 070 0

Australian/New Zealand Standard™

Digital addressable lighting interface

**Part 209: Particular requirements for control gear
— Colour control (device type 8) (IEC 62386-
209:2011 (ED. 1.0) MOD)**

First published as AS/NZS 62386.209:2020.



© IEC 2020 — All rights reserved

© Standards Australia Limited/the Crown in right of New Zealand, administered by the New Zealand Standards Executive 2020

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth) or the Copyright Act 1994 (New Zealand).

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-041, Lamps and Related Equipment.

The objective of this document is to specify a protocol and test procedures for the control by digital signals of electronic control gear that can change their light colour.

Tests in this document are type tests. Requirements for testing individual control gear during production are not included.

This document is an adoption with national modifications, and has been reproduced from, IEC 62386-209:2011 (ED. 1.0), *Digital addressable lighting interface — Part 209: Particular requirements for control gear — Colour control (device type 8)*. The modifications are additional requirements and are set out in [Appendix ZZ](#), which has been added at the end of the source text.

[Appendix ZZ](#) lists the variations to IEC 62386-209:2011 (ED. 1.0), for the application of this Standard in Australia and New Zealand.

As this document has been reproduced from an International Standard, the following applies:

- (a) In the source text “this International Standard” should read “this document”.
- (b) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

NOTES

CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references.....	11
3 Terms and definitions.....	11
4 General.....	13
4.4 Colour type.....	13
4.4.1 General.....	13
4.4.2 Colour type: xy-coordinate.....	14
4.4.3 Colour type: colour temperature T_c	14
4.4.4 Colour type: primary N.....	15
4.4.5 Colour type: RGBWAF.....	15
5 Electrical specification.....	16
6 Interface power supply.....	16
7 Transmission protocol Structure.....	16
8 Timing.....	16
9 Method of operation.....	16
9.1 Logarithmic dimming curve, arc power levels and accuracy.....	16
9.1.1 Colour light output versus arc power level.....	16
9.1.2 Direct arc power level.....	16
9.1.3 Indirect arc power levels.....	17
9.2 Power on.....	18
9.2.1 General.....	18
9.2.2 Store power on colour.....	18
9.2.3 Query power on colour.....	18
9.3 Interface-failure.....	19
9.3.1 General.....	19
9.3.2 Store system failure colour.....	19
9.3.3 Query system failure colour.....	19
9.4 Min and max level.....	20
9.5 Fade time and fade rate.....	20
9.6 Reaction to commands during error state.....	20
9.9 16 Bit data transfer for the application extended control commands.....	20
9.10 Multi colour type control gear.....	20
9.11 Colour scenes.....	21
9.11.1 General.....	21
9.11.2 Store colour scene XXXX.....	21
9.11.3 Remove colour scene XXXX.....	21
9.11.4 Go to colour scene XXXX.....	21
9.11.5 Query colour scene XXXX.....	22
9.12 Colour change.....	22
9.12.1 Colour type xy-coordinate.....	22
9.12.2 Colour type colour temperature T_c	22
9.12.3 Colour type change.....	22
9.12.4 Temporary colour setting.....	22

9.12.5	Activate colour settings	23
9.12.6	Reporting colour settings	26
9.12.7	Copy from report to temporary variables	26
9.13	Colour temperature T_C limits	26
10	Declaration of variables	27
11	Definition of commands	30
11.1	Arc power control commands.....	30
11.1.1	Direct arc power control command.....	30
11.1.2	Indirect arc power control commands	30
11.2	Configuration commands	31
11.2.1	General configuration commands	31
11.2.2	Arc power parameters settings	31
11.2.3	System parameters settings	32
11.3	Query commands	32
11.3.1	Queries related to status information	32
11.3.2	Queries related to arc power parameters settings	32
11.3.3	Queries related to system parameter settings	33
11.3.4	Application extended commands	33
11.4	Special commands	42
11.4.4	Extended special commands	42
11.5	Summary of the command set	42
11.5.1	Summary of the extended application command set	42
11.5.2	Command versus colour type cross-reference	43
11.5.3	Command versus the DTR, DTR1 and DTR2 cross-reference table	44
12	Test procedures	46
12.2	Test sequences 'Configuration commands'	46
12.2.1	Test sequences 'General configuration commands'.....	46
12.7	Test sequences 'Application extended commands for device type 8'.....	66
12.7.1	Test sequences 'APPLICATION EXTENDED QUERY COMMANDS'	66
12.7.2	Test sequences 'Application extended configuration commands'	83
12.7.3	Test sequence 'ENABLE DEVICE TYPE'	157
12.7.4	Test sequences "Application extended control commands"	160
12.7.5	Test sequences 'Standard application extended commands'	195
13	General subsequences	197
13.1	Test sequence "Set16bitValue (val)".....	197
13.2	Test sequence "SetSpecific16bitValue (val)"	198
13.3	Test sequence "Get16bitValue ()"	199
13.4	Test sequence "Get16bitColourValue ()"	200
	Bibliography.....	201

Figure 1 – The CIE color space chromaticity diagram, 1931 Cambridge University Press	14
Figure 2 – Black body line.....	15
Figure 3 – Colour temperature diagram	15
Figure 4 – Application extended configuration command sequence example	36
Figure 5 – Test sequence "RESET".....	47
Figure 6 – Test sequence "testResetDefault (Colour Type)"	48
Figure 7 – Test sequence "testReset_xy"	50

Figure 8 – Test sequence “testReset_Tc”	52
Figure 9 – Test sequence “testReset_PrimaryN”	54
Figure 10 – Test sequence “testReset_RGBWAF”	56
Figure 11 – Test sequence “testResetNoChange_xy”	57
Figure 12 – Test sequence “testResetNoChange_Tc”	59
Figure 13 – Test sequence “testResetNoChange_PrimaryN”	61
Figure 14 – Test sequence “testResetNoChange_RGBWAF”	62
Figure 15 – Test sequence “testResetIndependentColourType”	63
Figure 16 – Test sequence “Save_PrimaryN”	64
Figure 17 – Test sequence “Restore_PrimaryN (xPrimary, yprimary, TYPrimary)”	65
Figure 18 – Test sequence “QUERY GEAR FEATURES/STATUS”	66
Figure 19 – Test sequence “QUERY COLOUR STATUS”	68
Figure 20 – Test sequence “ActivateAndCheck (ColourType, curActive)”	69
Figure 21 – Test sequence “xyOutOfRangeCheck()”	71
Figure 22 – Test sequence “TcOutOfRangeCheck”	72
Figure 23 – Test sequence “CheckOnlyOneColourTypeActive”	73
Figure 24 – Test sequence “TcOutOfRangePhysWarmest”	74
Figure 25 – Test sequence “TcOutOfRangeCheckPhysCoolest”	75
Figure 26 – Test sequence ‘QUERY COLOUR TYPE FEATURES’	76
Figure 27 – Test sequence ‘QUERY COLOUR VALUE’	79
Figure 28 – Test sequence “QUERY RGBWAF CONTROL”	81
Figure 29 – test sequence “QUERY ASSIGNED COLOUR”	82
Figure 30 – Test sequence “STORE TY PRIMARY N”	84
Figure 31 – Test sequence “CheckDTR2Behaviour8(nrPrim)”	85
Figure 32 – Test sequence “STORE xy-COORDINATE PRIMARY N”	87
Figure 33 – Test sequence “CheckDTR2Behaviour_XY(nrPrim)”	89
Figure 34 – Test sequence “STORE COLOUR TEMPERATURE Tc LIMIT”	90
Figure 35 – Test sequence “TcCheckDTR2Behaviour()”	91
Figure 36 – Test sequence “TcSavePhysicalLimits”	92
Figure 37 – Test sequence “TcRestorePhysicalLimits(phLimits)”	93
Figure 38 – Test sequence “TcCheckLimits”	95
Figure 39 – Test sequence “STORE GEAR FEATURES/STATUS”	96
Figure 40 – Test sequence “AUTOMATIC ACTIVATE”	97
Figure 41 – Test sequence “AutoActivate_xy (min_level, command, delay, expected_level)”	98
Figure 42 – Test sequence “NoAutoActivate_xy (min_level, command, delay, expected_level)”	99
Figure 43 – Test sequence “AutoActivate_Tc (min_level, command, delay, expected_level)”	100
Figure 44 – Test sequence “NoAutoActivate_Tc (min_level, command, delay, expected_level)”	101
Figure 45 – Test sequence “AutoActivate_PrimaryN (min_level, command, delay, expected_level)”	102
Figure 46 – Test sequence “NoAutoActivate_PrimaryN (min_level, command, delay, expected_level)”	103

Figure 47 – Test sequence “AutoActivate_RGBWAF (min_level, command, delay, expected_level)”	104
Figure 48 – Test sequence “NoAutoActivate_RGBWAF (min_level, command, delay, expected_level)”	105
Figure 49 – Test sequence “AutoActivate_Dapc0”	106
Figure 50 – Test sequence “AutoActivate_Off”	107
Figure 51 – Test sequence “Load_xy_Coordinate (point_x, point_y)”	108
Figure 52 – Test sequence “Get_actual_xy ()”	109
Figure 53 – Test sequence “findTwoValid_Tc_Points ()”	110
Figure 54 – Test sequence “Load_Tc (Tc_value)”	111
Figure 55 – Test sequence “Get_actual_Tc ()”	112
Figure 56 – Test sequence “findTwoValid_PrimaryN_Points ()”	113
Figure 57 – Test sequence “Load_PrimaryN(point_PrimaryN)”	114
Figure 58 – Test sequence “Get_actual_PrimaryN ()”	115
Figure 59 – Test sequence “findTwoValid_RGBWAF_Pionts ()”	116
Figure 60 – Test sequence “Load_RGBWAF(point_RGBWAF)”	117
Figure 61 – Test sequence “Get_actual_RGBWAF ()”	118
Figure 62 – Test sequence “ToggleAutoActivation(auto)”	119
Figure 63 – Test sequence “ASSIGN COLOUR TO LINKED CHANNEL ”	120
Figure 64 – Test sequence “START AUTO CALIBRATION”	122
Figure 65 – Test sequence “POWER ON COLOUR”	123
Figure 66 – Test sequence “PowerOnBehaviour_xy”	125
Figure 67 – Test sequence “PowerOnBehaviour_Tc”	127
Figure 68 – Test sequence “PowerOnBehaviour_PrimaryN”	129
Figure 69 – Test sequence “PowerOnBehaviour_RGBWAF”	131
Figure 70 – Test sequence “PowerOnBehaviourMask_xy”	132
Figure 71 – Test sequence “PowerOnBehaviourMask_Tc”	133
Figure 72 – Test sequence “PowerOnBehaviourMask_PrimaryN”	135
Figure 73 – Test sequence “PowerOnBehaviourMask_RGBWAF”	137
Figure 74 – Test sequence “SYSTEM FAILURE”	139
Figure 75 – Test sequence “SystemFailureBehaviour_xy”	141
Figure 76 – Test sequence “SystemFailureBehaviour_Tc”	143
Figure 77 – Test sequence “SystemFailureBehaviourPrimaryN”	145
Figure 78 – Test sequence “SystemFailureBehaviour_RGBWAF”	147
Figure 79 – Test sequence “SystemFailureBehaviourMask_xy”	148
Figure 80 – Test sequence “SystemFailureBehaviourMask_Tc”	149
Figure 81 – Test sequence “SystemFailureBehaviourMask_PrimaryN”	151
Figure 82 – Test sequence “SystemFailureBehaviourMask_RGBWAF”	153
Figure 83 – Test sequence “STORE THE DTR AS SCENE XXXX/ GOTO SCENE XXXX”	155
Figure 84 – Test sequence “SetTemporaries (col, val)”	156
Figure 85 – Test sequence “ENABLE DEVICE TYPE: Application extended commands”	158
Figure 86 – Test sequence “ENABLE DEVICE TYPE: Application extended configuration commands”	159

Figure 87 – Test sequence “SET TEMPORARY x-COORDINATE”	160
Figure 88 – Test sequence “SET TEMPORARY y-COORDINATE”	161
Figure 89 – Test sequence “ACTIVATE”	162
Figure 90 – Test sequence “FindTwoValid_xy_Points (point1_x, point1_y, point2_x, point2_y)”	163
Figure 91 – Test sequence “Goto_xy_Coordinate (Point_x, point_y)”	164
Figure 92 – Test sequence “x-COORDINATE STEP UP”	165
Figure 93 – Test sequence “ActivateColourType (Colour Type)”	166
Figure 94 – Test sequence “x-COORDINATE STEP DOWN”	167
Figure 95 – Test sequence “Get MainPointxy ()”	168
Figure 96 – Test sequence “GetCurrentPointxy ()”	169
Figure 97 – Test sequence “xymodeGetMainPointxy ()”	170
Figure 98 – Test sequence “SET TEMPORARY COLOUR TEMPERATURE T _C ”	171
Figure 99 – Test sequence “FindValidTcValue (TcValue)”	172
Figure 100 – Test sequence “CheckAllTcValues ()”	173
Figure 101 – Test sequence “COLOUR TEMPERATURE T _C STEP COOLER”	174
Figure 102 – Test sequence “COLOUR TEMPERATURE T _C STEP WARMER”	175
Figure 103 – Test sequence “SET TEMPORARY PRIMARY N DIMLEVEL”	176
Figure 104 – Test sequence “CheckPrimaryNFadingBehaviour (nPrim)”	177
Figure 105 – Test sequence “SET TEMPORARY RGB DIMLEVEL”	178
Figure 106 – Test sequence “CheckRGBFadingBehaviour ()”	179
Figure 107 – Test sequence “SET TEMPORARY WAF DIMLEVEL”	180
Figure 108 – Test sequence “CheckWAFFadingBehaviour ()”	181
Figure 109 – Test sequence “SET RGBWAF CONTROL”	182
Figure 110 – Test sequence “Chan_Col_Control_ActivationTest (nrChan)”	183
Figure 111 – “Norm_Col_Control_ActivationTest ()”	184
Figure 112 – Test sequence “Transition_To_Inactive_Test ()”	185
Figure 113 – Test sequence “COPY REPORT TO TEMPORARY”	186
Figure 114 – Test sequence “Copy_xy ()”	187
Figure 115 – Test sequence “Copy_Tc ()”	188
Figure 116 – Test sequence “Copy_PrimaryN ()”	189
Figure 117 – Test sequence “Copy_RGBWAF ()”	190
Figure 118 – Test sequence “PrimaryN_Check1 (nrPrim)”	191
Figure 119 – Test sequence “PrimaryN_Check2 (nrPrim)”	192
Figure 120 – Test sequence “RGBWAF_Check1 (nrChan)”	193
Figure 121 – Test sequence “RGBWAF_Check2 (nrChan)”	194
Figure 122 – Test sequence “QUERY EXTENDED VERSION NUMBER”	195
Figure 123 – Test sequence “RESERVED APPLICATION EXTENDED COMMANDS”	196
Figure 124 – “Set16bitValue (val)”	197
Figure 125 – Test sequence “SetSpecific16bitValue (val)”	198
Figure 126 – Test sequence “Get16bitValue ()”	199
Figure 127 – Test sequence “Get16bitColourValue ()”	200

Table 1 – Power on.....	18
Table 2 – Interface failure.....	19
Table 3 – Min and Max level.....	20
Table 4 – Colour scenes.....	21
Table 5 – System reaction on DAPC and TEMPORARY COLOUR TYPE.....	24
Table 6 – System reaction on commands and colour type.....	24
Table 7 – T_c limit change behaviour.....	27
Table 8 – Declaration of variables.....	28
Table 9 – Store colour temperature T_c limit.....	37
Table 10 – Assign channel to colour.....	37
Table 11 – Query colour value.....	39
Table 12 – Query assigned colour.....	42
Table 13 – Summary of the extended application command set.....	42
Table 14 – Command versus colour type cross-reference.....	44
Table 15 – Command versus the DTR, DTR1 and DTR2 cross-reference.....	45
Table 16 – Command returns to test sequence “QUERY COLOUR VALUE”.....	77

INTERNATIONAL ELECTROTECHNICAL COMMISSION

DIGITAL ADDRESSABLE LIGHTING INTERFACE –**Part 209: Particular requirements for control gear –
Colour control (device type 8)**

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.

International Standard IEC 62386-209 has been prepared by subcommittee 34C: Auxiliaries for lamps, of IEC technical committee 34: Lamps and related equipment.

This publication contains attached .pdf files, which reproduce the test sequences illustrated in Figures 5 to 127. These files are intended to be used as a complement and do not form an integral part of the publication.

The text of this standard is based on the following documents:

FDIS	Report on voting
34C/964/FDIS	34C/978/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This Part 209 is intended to be used in conjunction with IEC 62386-101 and IEC 62386-102, which contain general requirements for the relevant product type (control gear or control devices).

A list of all parts of the IEC 62386 series, under the general title *Digital addressable lighting interface*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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 first edition of IEC 62386-209 is published in conjunction with IEC 62386-101 and IEC 62386-102. The division of IEC 62386 into separately published parts provides for ease of future amendments and revisions. Additional requirements will be added as and when a need for them is recognised.

This International Standard, and the other parts that make up the IEC 62386-200 series, in referring to any of the clauses of IEC 62386-101 or IEC 62386-102, specifies the extent to which such a clause is applicable and the order in which the tests are to be performed. The parts also include additional requirements, as necessary. All parts that make up the IEC 62386-200 series are self-contained and therefore do not include references to each other.

Where the requirements of any of the clauses of IEC 62386-101 or IEC 62386-102 are referred to in this International Standard by the sentence "The requirements of IEC 62386-1XX, clause 'n' apply", this sentence is to be interpreted as meaning that all requirements of the clause in question of Part 101 or Part 102 apply, except any which are inapplicable to the specific type of lamp control gear covered by Part 209.

All numbers used in this International Standard are decimal numbers unless otherwise noted. Hexadecimal numbers are given in the format 0xVV, where VV is the value. Binary numbers are given in the format XXXXXXXXb or in the format XXXX XXXX, where X is 0 or 1; 'x' in binary numbers means 'don't care'.

DIGITAL ADDRESSABLE LIGHTING INTERFACE –

Part 209: Particular requirements for control gear – Colour control (device type 8)

1 Scope

This International Standard specifies a protocol and test procedures for the control by digital signals of electronic control gear that can change their light colour.

NOTE Tests in this standard are type tests. Requirements for testing individual control gear during production are not included.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62386-101:2009, *Digital addressable lighting interface – Part 101: General requirements – System*

IEC 62386-102:2009, *Digital addressable lighting interface – Part 102: General requirements – Control gear*

CIE (1932), *Commission internationale de l'Eclairage proceedings, 1931. Cambridge University Press, Cambridge.*

CIE 17-4:1987, *International lighting vocabulary, ISBN 978 3 900734 07 7*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in Clause 3 of IEC 62386-101:2009 and Clause 3 of IEC 62386-102:2009 apply, with the following additional definitions.

3.1

colour type

mechanism to set a colour in an appropriate way

3.2

xy chromaticity

colour type, representing the colour matching functions of a standard observer according to the Commission Internationale de L'Eclairage (CIE) basis for colorimetry of 1931

3.3

colour temperature

T_c

colour type, representing the colour of a light source that matches the temperature of a black body radiator according to Planck's law