

Australian/New Zealand Standard™

Lighting for roads and public spaces

**Part 1.2: Vehicular traffic (Category V)
lighting—Guide to design, installation,
operation and maintenance**



AS/NZS 1158.1.2:2010

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee LG-002, Lighting for Roads and Public Space. It was approved on behalf of the Council of Standards Australia on 26 March 2010 and on behalf of the Council of Standards New Zealand on 29 March 2010.
This Standard was published on 10 June 2010.

The following are represented on Committee LG-002:

Astronomical Society of Australia
Australian Industry Group
Australian Local Government Association
CIE Australia Inc.
Department of Transport and Main Roads, Queensland
Energy Networks Association
IES: The Lighting Society
Ingenium
Lighting Council Australia
Lighting Council New Zealand
Local Government and Shires Associations of NSW
Main Roads Western Australia
National Appliance and Equipment Energy Efficiency Committee
New Zealand Transport Agency
Roads and Traffic Authority of NSW

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com.au or Standards New Zealand web site at www.standards.co.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

This Standard was issued in draft form for comment as DR 08181.

Australian/New Zealand Standard™

Lighting for roads and public spaces

Part 1.2: Vehicular traffic (Category V) lighting—Guide to design, installation, operation and maintenance

Originated as AS/NZS 1158.1.3:1997.
Revised and redesignated as AS/NZS 1158.1.2:2010.

COPYRIGHT

© Standards Australia/Standards New Zealand

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.

Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6140

ISBN 978 0 7337 9601 2

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee LG-002, Lighting for Roads and Public Spaces, to supersede AS/NZS 1158.1.3–1997 *Road Lighting Part 1.3: Vehicular traffic (Category V) lighting—Guide to design, installation, operation and maintenance*, now designated as Part 1.2.

This Standard is part of the AS/NZS 1158 series, *Lighting for roads and public spaces*, which covers lighting schemes for most roads and public spaces.

The performance criteria for such lighting schemes may include any or all of the following:

- (a) Facilitation of safe movement.
- (b) The discouragement of illegal acts.
- (c) Contributing to the amenity of an area through increased aesthetic appeal.

The series has divided road lighting into the following two broad categories:

- (i) *Category V lighting* Lighting that is applicable to roads on which the visual requirements of motorists are dominant, e.g. traffic routes.
- (ii) *Category P lighting* Lighting that is applicable to roads on which the visual requirements of pedestrians are dominant, e.g. local roads and lighting that is applicable to outdoor public areas, other than roads, where the visual requirements of pedestrians are dominant, e.g. outdoor shopping precincts.

This Standard applies to Category V lighting.

Its objective is to provide guidance to those concerned with design, installation, operation and maintenance of such lighting, to facilitate compliance with the requirements of AS/NZS 1158.1.1.

The following Standards have been issued in the AS/NZS 1158 series:

AS/NZS

1158	Lighting for roads and public spaces
1158.0	Part 0: Introduction
1158.1.1	Part 1.1: Vehicular traffic (Category V) lighting—Performance and design requirements
1158.1.2	Part 1.2: Vehicular traffic (Category V) lighting—Guide to design, installation, operation and maintenance (this Standard)
1158.2	Part 2: Computer procedures for the calculation of light technical parameters for Category V and Category P lighting
1158.3.1	Part 3.1: Pedestrian area (Category P) lighting—Performance and installation design requirements
1158.4	Part 4: Lighting of pedestrian crossings
1158.5	Part 5: Tunnels and underpasses
1158.6	Part 6: Luminaires

Road lighting is acknowledged to be an effective crash counter-measure. The costs involved in providing road lighting can be demonstrated to provide significant financial and community benefits in terms of reductions in road crashes at night. Studies in Australia and New Zealand, and in other countries, have led to the conclusion that traffic route lighting is likely to reduce night time casualty crashes by about 30%, taken over the road network. A summary of the findings of lighting and crashes is given in Appendix C. (See also Ref. 9, 20 and 21 in Paragraph A2.)

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
FOREWORD.....	7
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	8
1.2 REFERENCED DOCUMENTS	8
1.3 DEFINITIONS	8
SECTION 2 WHY WE LIGHT ROADS	
2.1 ROAD LIGHTING OBJECTIVES	9
2.2 ROAD SAFETY	9
2.3 ROAD LIGHTING AS A CRASH COUNTERMEASURE.....	9
2.4 SECURITY AND AMENITY	9
SECTION 3 LIGHTING PRINCIPLES	
3.1 VISUAL PROCESSES AND THE LIGHTING NEEDS OF ROAD USERS	10
3.2 LIGHTING INSTALLATIONS AND LIGHT TECHNICAL PARAMETERS	10
3.3 FACTORS AFFECTING PAVEMENT LUMINANCE	12
3.4 PAVEMENT REFLECTANCE	15
SECTION 4 POLICY CONSIDERATIONS	19
SECTION 5 EQUIPMENT	
5.1 GENERAL	20
5.2 LAMPS.....	20
5.3 ROAD LIGHTING LUMINAIRES	20
5.4 BRACKET ARMS AND POLES	22
SECTION 6 DESIGN PROCESS	
6.1 GENERAL	23
6.2 BASES OF ROAD LIGHTING PROCESS	23
6.3 SIMPLIFIED LIGHTING DESIGN PROCESS.....	23
6.4 FULL ROAD LIGHTING DESIGN PROCESS	24
SECTION 7 DESIGN CONSIDERATIONS	
7.1 GENERAL	26
7.2 ROAD SAFETY CONSIDERATIONS	26
7.3 ENVIRONMENTAL CONSIDERATIONS	28
7.4 TREE-LINED TRAFFIC ROUTES.....	29
7.5 WEATHER CONDITIONS.....	30
7.6 REFLECTING PROPERTIES OF ROAD SURFACES	31
7.7 ROAD LAYOUT.....	31
7.8 ROADWAY FEATURES.....	31
7.9 SURROUNDING BACKGROUNDS TO ROAD.....	32
7.10 VISIBILITY OF ROAD SIGNS	32
7.11 AESTHETICS	32

SECTION 8 DESIGN RECOMMENDATIONS	
8.1	INSTALLATION GEOMETRY 33
8.2	LAMP WATTAGE..... 35
8.3	MEDIAN BARRIERS 35
8.4	MEDIAN 35
8.5	CURVES AND BENDS 35
8.6	ROUNDAOBOUTS 36
8.7	CRESTS AND HUMPS..... 38
8.8	TREE-LINED TRAFFIC ROUTES 38
8.9	SHORT BRIDGES, UNDERPASSES AND SHORT TUNNELS 41
8.10	ORIENTATION OF LUMINAIRES 42
8.11	TERMINATION OF ROAD LIGHTING 42
SECTION 9 DESIGN METHODS	
9.1	GENERAL 43
9.2	COMPUTER DESIGN 43
SECTION 10 DESIGN OF INSTALLATION	
10.1	PROCEDURES USED IN LIGHTING DESIGN 45
10.2	MINIMUM DESIGN AREAS FOR APPLICATION OF ILLUMINANCE REQUIREMENTS TO SPECIFIC ROAD SITUATIONS 45
10.3	LIGHTING LAYOUTS 46
10.4	ELECTRICAL DESIGN..... 47
10.5	CIVIL/STRUCTURAL WORKS..... 48
10.6	LIGHTING DESIGN AUDIT 48
SECTION 11 DOCUMENTATION	
11.1	EVIDENCE OF COMPLIANCE 50
11.2	ESTIMATES AND MATERIAL LISTS 50
SECTION 12 INSTALLATION	
12.1	STANDARDS, REGULATIONS AND OTHER REQUIREMENTS 51
12.2	INSTALLATION AUDIT 51
SECTION 13 OPERATION	
13.1	HOURS OF OPERATION 55
13.2	SWITCHING CONTROL 55
13.3	ADVANCED CENTRAL ROAD LIGHTING CONTROL SYSTEMS..... 56
SECTION 14 ASSET MANAGEMENT MAINTENANCE	
14.1	GENERAL PURPOSE 57
14.2	FACTORS AFFECTING PERFORMANCE 57
14.3	LAMP OUTAGES..... 57
14.4	LAMP AND LUMINAIRE DEPRECIATION 61
14.5	THE ASSET MANAGEMENT MAINTENANCE PROGRAM..... 64

APPENDICES

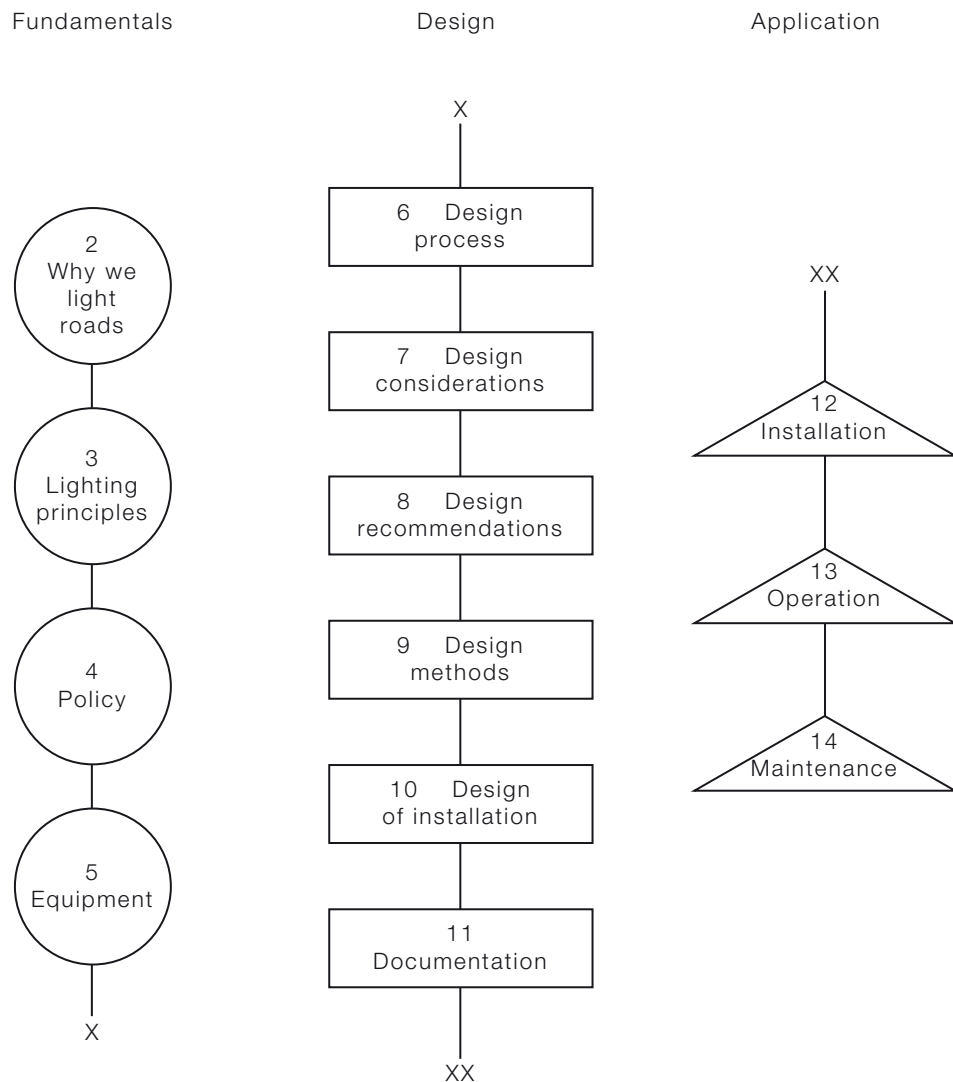
A	REFERENCED AND RELATED DOCUMENTS	69
B	GUIDELINES FOR THE USE AND PLACEMENT OF RIGID AND FRANGIBLE ROAD LIGHTING POLES	71
C	THE PROBLEM OF NIGHT ROAD CRASHES AND ROAD LIGHTING AS A CRASH COUNTERMEASURE.....	85
D	TYPICAL FULL ROAD LIGHTING DESIGN PROCESS	88
E	TYPICAL PERFORMANCE CURVES SHOWING LAMP MORTALITY AND LUMEN DEPRECIATION.....	93
F	INDICATIVE LIGHTING LAYOUTS FOR SPECIFIC ROAD SITUATIONS.....	96

FOREWORD

The subject matter covered in this Standard is divided into three main elements, as follows:

- (a) *Fundamentals* The information that must be known before engaging in a road lighting design.
- (b) *Design* The considerations and processes involved in the development of a design for a road lighting scheme.
- (c) *Application* Advice relating to the installation, operation and maintenance of a road lighting scheme.

These three broad subject areas are further divided into sections within this Standard as shown in the flow chart below.



STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Lighting for roads and public spaces

**Part 1.2: Vehicular traffic (Category V) lighting—Guide to design,
installation, operation and maintenance**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out requirements, background information, guidelines and other relevant information for the design, installation, operation and maintenance of Category V lighting schemes intended to comply with AS/NZS 1158.1.1. It should be read in conjunction with that Standard. For the purpose of this Standard, the lighting categories set out in AS/NZS 1158.1.1 apply. Table 2.1 of that Standard describes typical applications for each of the lighting categories given.

The Standard does not purport to cover every possible means of ensuring compliance with AS/NZS 1158.1.1.

Much of this Standard is also applicable to lighting schemes intended to comply with AS/NZS 1158.3.1 and reading of it in conjunction with that Standard is recommended.

The appropriate lighting category for a particular road is a matter for determination in consultation with the road or traffic authority concerned.

1.2 REFERENCED DOCUMENTS

A list of the Standards and other documents referred to in this Standard is given in Appendix A. The Appendix also lists a number of additional documents that are considered useful sources of information on the subject of this Standard.

1.3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 1158.0 apply.

NOTE: See Paragraph B3 of Appendix B for definitions of terms related to the use and placement of road lighting poles.