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# Australian Standard 1338, Parts 1 to 3—1981

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## FILTERS FOR EYE PROTECTORS

Part 1—FILTERS FOR PROTECTION  
AGAINST RADIATION  
GENERATED IN WELDING AND  
ALLIED OPERATIONS

Part 2—FILTERS FOR PROTECTION  
AGAINST ULTRAVIOLET  
RADIATION *Superseded by AS/NZS 1338.1:1992*

Part 3—FILTERS FOR PROTECTION  
AGAINST INFRARED RADIATION  
*Superseded by AS/NZS 1338.3:1992*



STANDARDS ASSOCIATION OF AUSTRALIA  
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Chamber of Commerce  
Australian Council of Trade Unions  
Australian Medical Association  
Australian Welding Institute  
Bureau of Steel Manufacturers  
Confederation of Australian Industry  
Department of Defence  
Department of Health  
Department of Industrial Relations, N.S.W.  
Department of Labour and Industry, Vic.  
Department of Labour and Industry, W.A.  
Department of Labour Relations, Qld  
Department of Science and Technology  
Electricity Supply Association of Australia  
Health Commission of New South Wales  
Metal Trades Industry Association of Australia  
National Safety Council of Australia  
Optical Distributors and Manufacturers Association of Australia  
Railways of Australia Committee  
Royal Australian Chemical Institute  
University of New South Wales  
Victorian College of Optometry, University of Melbourne

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*This standard was issued in draft form for public review as DR 79122 to DR 79124.*

AUSTRALIAN STANDARD

# FILTERS FOR EYE PROTECTORS

## Part 1

FILTERS FOR PROTECTION AGAINST  
RADIATION GENERATED IN WELDING  
AND ALLIED OPERATIONS

## Part 2

FILTERS FOR PROTECTION AGAINST  
ULTRAVIOLET RADIATION

## Part 3

FILTERS FOR PROTECTION AGAINST  
INFRARED RADIATION

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## PREFACE

This edition of this standard was prepared by the Association's Committee on Eye Protection at the request of the Safety Standards Board to supersede the 1974 edition.

This edition incorporates technical and editorial amendments identified as necessary during the application of the 1974 edition, and includes new requirements for filters for eye protectors providing protection for the eye against the hazards of ultraviolet and infrared radiations.

The standard is in three parts, each part prescribing filters for a particular application, the requirements for these filters being substantially aligned with ISO (International Organization for Standardization) requirements. Acknowledgement is made of the assistance received therefrom.

Specific requirements as prescribed for filters for eye protectors intended to provide users with adequate protection against intense ultraviolet, visible and/or infrared radiation; appendices describe methods of tests and provide guidance on the selection of filters for particular applications. An 'Annex' lists a number of definitions, symbols and terms adopted from the publications AS 1852(45), ISO 31/6 and ISO 4007, which are subsidiary to the contents of the standard. The contents of this Annex may be of assistance in determining the parameters of filters.

Limits for the mean transmittances in the erythral and near ultraviolet region are equivalent to ISO recommendations. Filters complying with these limits will allow the ratio of ultraviolet to visible light at the user's eyes to be no higher than the corresponding ratio found in natural sunlight. In addition, the method of specifying the near ultraviolet transmittances excludes glass filters of the type which have relatively high transmittances near 400 nm; such exclusion is considered necessary because excessive amounts of near ultraviolet radiation may produce a subjective visual haze resulting from fluorescence of the crystalline lens of the eye.

Limits for mean transmittances of near infrared radiation have been set so that the concentration of infrared radiation on the retinas of the users eyes will be well below the concentration which is known to produce retinal burns with consequent partial loss of sight.

Limits for the maximum transmittances of mid-infrared radiation at any wavelength between 1200 nm and 2000 nm are those recommended by ISO. Filters complying with such limits will allow the ratio of infrared to visible light at the users eyes to be no higher than the corresponding ratio found in direct sunlight. This will preclude the possibility of welders developing cataracts from the effects of heat energy radiated during a welding process while the infrared transmittance limits as a whole will prevent the occurrence of subjective eye discomfort which otherwise may be caused by radiant heat and consequent rise in temperature of the eye tissue.

In welding operations the maximum possible protection is given to the eyes of welders when the filter has the correct shade number for the work being performed; filters that are too light or insufficiently dense for the job in hand may result in temporary or permanent eye damage, while the use of filters that are too dense, i.e. with shade numbers that are too high for the job in hand, will lead to poor quality welding and the possibility of injury by accident. The guidelines provided in AS 1336\* should be closely followed.

This standard does not apply to filters for eye protectors for protection against laser beams or the microwave portions of the electromagnetic spectrum.

This standard may require reference to the following standards:

AS 1199	Sampling Procedures and Tables for Inspection by Attributes
AS 1336	Code of Practice for Industrial Eye Protection*
AS 1337	Eye Protectors for Industrial Applications
AS 1399	Guide to AS 1199, Sampling Procedures and Tables for Inspection by Attributes
AS 1852	International Electrotechnical Vocabulary 1852(45)—Lighting
ISO 31/6	Quantities and Units of Light and Related Electromagnetic Radiations
ISO 4007	Personal Eye-protectors—Vocabulary

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\*In course of revision.

## CONTENTS

	<i>Page</i>
<b>PART 1—FILTERS FOR PROTECTION AGAINST RADIATION GENERATED IN WELDING AND ALLIED OPERATIONS</b>	
<b>SECTION 1. SCOPE, APPLICATION AND DEFINITIONS</b>	
1.1 Scope .....	5
1.2 Application .....	5
1.3 Definitions .....	5
<b>SECTION 2. GENERAL REQUIREMENTS</b>	
2.1 Filters for Gas Welding .....	6
2.2 Filters for Electric Welding .....	8
2.3 Filter Covers .....	10
2.4 Testing .....	10
<b>SECTION 3. DETERMINATION OF TRANSMITTANCES</b>	
3.1 Transmittances for Ultraviolet Radiation .....	11
3.2 Luminous Transmittance .....	11
3.3 Transmittances for Infrared Radiation .....	11
<b>SECTION 4. TESTING</b>	
4.1 General .....	12
4.2 Sequence or Grouping of Test Specimens .....	12
<b>SECTION 5. MARKING</b>	
5.1 Marking of Filters .....	13
<b>APPENDICES</b>	
A Method for the Determination of Permanence of Filters .....	14
B Guidance on Selection and Use of Filters for Protection Against Optical Radiation Generated During Welding and Allied Operations	15
 <b>PART 2—FILTERS FOR PROTECTION AGAINST ULTRAVIOLET RADIATION</b>	
<b>SECTION 1. SCOPE, APPLICATION AND DEFINITIONS</b>	
1.1 Scope .....	17
1.2 Application .....	17
1.3 Definitions .....	17
<b>SECTION 2. CLASSIFICATION OF AND REQUIREMENTS FOR ULTRAVIOLET FILTERS</b>	
2.1 Transmittance Characteristics .....	18
2.2 Numbering of Filters .....	18
2.3 Pairs of Filters .....	18
2.4 Transmittance Limits .....	18
<b>SECTION 3. DETERMINATION OF TRANSMITTANCES</b>	
3.1 Transmittances for Ultraviolet and Visible Radiation .....	19
3.2 Luminous Transmittance .....	19
<b>SECTION 4. TESTING</b>	
4.1 General .....	19
4.2 Sequence or Grouping of Test Specimens .....	19

	<i>Page</i>
<b>SECTION 5. MARKING</b>	
5.1 Marking of Filters .....	20
<b>APPENDIX A. GUIDANCE ON SELECTION AND USE OF FILTERS FOR PROTECTION AGAINST ULTRAVIOLET RADIATION</b> .....	21
<b>PART 3—FILTERS FOR PROTECTION AGAINST INFRARED RADIATION</b>	
<b>SECTION 1. SCOPE, APPLICATION AND DEFINITIONS</b>	
1.1 Scope .....	22
1.2 Application .....	22
1.3 Definitions .....	22
<b>SECTION 2. CLASSIFICATION OF AND REQUIREMENTS FOR INFRARED FILTERS</b>	
2.1 Transmittance Characteristics .....	23
2.2 Numbering of Filters .....	23
2.3 Pairs of Filters .....	23
2.4 Luminous Transmittance and Chromaticity Coordinates .....	23
2.5 Transmittance in the Ultraviolet Spectrum .....	23
<b>SECTION 3. DETERMINATION OF TRANSMITTANCES</b>	
3.1 Transmittances for Ultraviolet Radiation .....	26
3.2 Luminous Transmittance .....	26
3.3 Transmittances for Infrared Radiation .....	26
<b>SECTION 4. TESTING</b>	
4.1 General .....	27
4.2 Sequence or Grouping of Test Specimens .....	27
<b>SECTION 5. MARKING</b>	
5.1 Marking of Filters .....	28
<b>APPENDIX A. GUIDANCE ON SELECTION AND USE OF FILTERS FOR PROTECTION AGAINST INFRARED RADIATION</b> .....	29
<b>ANNEX. GLOSSARY OF DEFINITIONS, SYMBOLS AND TERMS USED FOR FOR SPECIFICATION AND EVALUATION OF FILTERS FOR EYE PROTECTORS</b> .....	30

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## STANDARDS ASSOCIATION OF AUSTRALIA

## Australian Standard

for

## FILTERS FOR EYE PROTECTORS

## PART 1—FILTERS FOR PROTECTION AGAINST RADIATION GENERATED IN WELDING AND ALLIED OPERATIONS

## SECTION 1. SCOPE, APPLICATION AND DEFINITIONS

**1.1 SCOPE.** This Part of this standard specifies requirements for filters used in eye protectors for protection against radiation of high intensity emitted during welding and allied operations. It specifies the shade numbers and the transmittance requirements of the filters and applies to filters made of glass or other materials for absorption of radiation.

This Part also applies to filter covers employed for the protection of filters from damage by abrasion and weld spatter, and to filters incorporated in demonstration welding booths in so far as the relevant requirements of Table 2.1 and Table 2.2 are appropriate.

**1.2 APPLICATION.** All filters shall comply with the requirements of Sections 2 and 4 and shall be marked as prescribed in Section 5.

**1.3 DEFINITIONS.** For the purpose of this Part, the following definitions apply (see also the Annex to Parts 1 to 3):

**Filter**—an optical material used to absorb and/or reflect harmful radiations emitted during welding and other allied industrial operations. It may be of plastics, solid glass, laminated construction or any other suitable material.

**Filter cover**—a transparent cover used to protect the filter(s) against abrasion and weld spatter. It may be of plastics or any other suitable material.

**Luminous transmittance ( $\tau_v$ )**—the ratio of the luminous flux transmitted by the filter to the incident luminous flux.

**Spectral transmittance ( $\tau(\lambda)$ )**—the ratio of radiant transmitted spectral flux to the incident spectral flux.

**Shade number ( $N$ )**—the class of the filter defined by its luminous transmittance density.

**Code number**—classification of specific type of filters.

**Erythema ultraviolet (EUV)**—radiation with wavelengths in the range 270 nm to 320 nm.

**Near ultraviolet (NUV)**—radiation with wavelengths in the range 320 nm to 380 nm.

**Near infrared (NIR)**—radiation with wavelengths in the range 780 nm to 1300 nm.

**Mid-infrared (MIR)**—radiation with wavelengths in the range 1300 nm to 2000 nm.

**Refractive power**—the property of a lens to diverge or converge rays of light expressed as the reciprocal of the focal length in metres.

## NOTES:

1. The unit of measurement for refractive power is reciprocal metre ( $m^{-1}$ ).
2. The former unit of measurement, i.e. dioptré, is extant in ophthalmology and optometry.
3. The power of a divergent lens is given a negative sign.

**Prismatic power**—the property of a lens to displace the image of an object expressed as 100 times the ratio of the apparent displacement of the object to the distance of the object from the lens.

## NOTES:

1. Prismatic power is a dimensionless quantity.
2. The former unit of measurement of prismatic power, i.e. prism dioptré, is numerically equal, and is extant in ophthalmology and optometry.