under revision See DR 91106 (for Part 1)
" " DR 91107 (" " 2)
" " DR 91108 (" " 3)

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Australian Standard 1338, Parts 1 to 3—1981

FILTERS FOR EYE PROTECTORS

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

superseded by AS/NZS 1338.1:1992

Part 2—FILTERS FOR PROTECTION AGAINST ULTRAVIOLET RADIATION

superseded by AS/NZS 1338.2:1992

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superseded by AS/NZS 1338.3:1992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

This standard, prepared by Committee SF/6, Eye Protection, was approved on behalf of the Council of the Standards Association of Australia on 29 May 1981, and was published on 21 September 1981.

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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

AS 1338, Parts 1 to 3—1981

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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 the Annex may be of assistance in determining the parameters of filters.

Limits for the mean transmittances in the erythemal 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 transmittance 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

*In course of revision.

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PART 3—FILTERS FOR PROTECTION AGAINST INFRARED RADIATION

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 (τ_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 special flux.

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

Code number—classification of specific type of filters.

Erythemal 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. dioptre, 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 dioptre, is numerically equal, and is extant in ophthalmology and optometry.