# INTERNATIONAL STANDARD 4851

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# Personal eye-protectors — Ultra-violet filters — Utilisation and transmittance requirements

*Protecteurs individuels de l'œil — Filtres pour l'ultraviolet — Utilisation et spécifications de transmission*

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## FOREWORD

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4851 was developed by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, and was circulated to the member bodies in April 1977.

It has been approved by the member bodies of the following countries :

| | | |
|---|---|---|
| Australia | Iran | South Africa, Rep. of |
| Austria | Ireland | Spain |
| Belgium | Israel | Switzerland |
| Brazil | Italy | Turkey |
| Denmark | Mexico | United Kingdom |
| Finland | New Zealand | U.S.S.R. |
| France | Norway | Yugoslavia |
| Germany, F. R. | Poland | |
| Hungary | Romania | |

No member body expressed disapproval of the document.



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# Personal eye-protectors — Ultra-violet filters — Utilisation and transmittance requirements

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the numbering of, and transmittance requirements for filters for protection against ultra-violet radiation. It also gives guidance on their selection and use.

Eye-protectors used for protection against ultra-violet radiation shall meet the general requirements given in ISO 4849. The latter also deals with general considerations relating to eye-protectors, such as identification.

Optical test methods for eye-protectors form the subject of ISO 4854.

Non-optical test methods for eye-protectors form the subject of ISO 4855.

## 2 REFERENCES

ISO 4007, *Personal eye-protectors — Vocabulary.*

ISO 4849, *Personal eye-protectors — Specifications.*[1)]

ISO 4854, *Personal eye-protectors — Optical test methods.*[1)]

ISO 4855, *Personal eye-protectors — Non-optical test methods.*[1)]

## 3 NUMBERING OF FILTERS

The complete table of numbering of filters is given in clause 3 of ISO 4849.

The symbol for filters for ultra-violet radiation includes a code number 2 or 3 and the shade number corresponding to the filter, from 1.2 to 5 (see clause 4 below).

## 4 TRANSMITTANCE REQUIREMENTS

The definitions of transmittance are given in ISO 4007.

The determination of transmittance is described in clause 5 of ISO 4854.

The transmittance variations measured by the scanning of a light beam of 5 mm diameter over the entire area of the filter, except on a marginal area 5 mm wide, shall remain within the limits defined as "relative uncertainty" in table 2 of ISO 4854.

The transmittance requirements for filters used for protection against ultra-violet radiation are given in table 1.

TABLE 1 — Transmittance requirements

| Scale number | Maximum transmittance in the ultra-violet spectrum $\tau$ ($\lambda$) | | Luminous transmittance $\tau_V$ | | Transmittance in the infra-red spectrum |
|---|---|---|---|---|---|
| | 313 nm % | 365 nm % | maximum % | minimum % | |
| 2 – 1.2 | 0,000 3 | 0,3 | 100 | 74,4 | |
| 2 – 1.4 | 0,000 3 | 0,3 | 74,4 | 58,1 | |
| 3 – 1.2 | 0,000 3 | 50 | 100 | 74,4 | |
| 3 – 1.4 | 0,000 3 | 35 | 74,4 | 58,1 | |
| 3 – 1.7 | 0,000 3 | 22 | 58,1 | 43,2 | No specification |
| 3 – 2 | 0,000 3 | 14 | 43,2 | 29,1 | |
| 3 – 2.5 | 0,000 3 | 6,4 | 29,1 | 17,8 | |
| 3 – 3 | 0,000 3 | 2,8 | 17,8 | 8,5 | |
| 3 – 4 | 0,000 3 | 0,95 | 8,5 | 3,2 | |
| 3 – 5 | 0,000 3 | 0,30 | 3,2 | 1,2 | |

1) At present at the stage of draft.

**Additional requirements :**

a) Between 210 and 313 nm, the transmittance shall not exceed the value specified for 313 nm.

b) Between 313 and 365 nm, the transmittance shall not exceed the value specified for 365 nm.

c) Between 365 and 380 nm, the transmittance shall not exceed the luminous transmittance.

d) In the wavelength range between 405 and 610 nm, the spectral transmittance for the scale numbers 3 – 1.2 to 3 – 5 shall not deviate from the luminous transmittance by more than 70 % of that value.

NOTE – Luminous transmittance values are based on the spectral distribution of illuminant A of the CIE.

## 5 GUIDANCE ON SELECTION AND USE

For protection against ultra-violet radiation, filters shall be selected from those classified by code numbers 2 or 3 (see table 2). Code number 2 filters may have a yellowish tinge which may modify colour perception.

When it is important to have correct colour perception, it is preferable to choose code 3 filters. Choice of a suitable UV filter also depends upon the degree of glare.

TABLE 2 – **Numbering properties and typical applications**

| Scale number | Properties | Typical applications |
|---|---|---|
| 2 – 1.2 | Filters may change colour perception<br>Appearance : very pale yellow | For use when total absorption of ultra-violet radiation is required |
| 2 – 1.4 | Filters may change colour perception<br>Appearance : pale yellow | For use when some absorption of visible light is required in addition to total absorption of ultra-violet radiation |
| 3 – 1.2<br>3 – 1.4<br>3 – 1.7 | No substantial modification of colour perception | For use with sources which produce predominantly ultra-violet radiation when glare is not an important factor. The lightest scales are effective in photographic reproduction work |
| 3 – 2.0<br>3 – 2.5 | No substantial modification of colour perception | For use with sources which produce both ultra-violet radiation and visible light to a high degree (for example, in ultra-violet ray therapy, particularly medical treatment) |
| 3 – 3<br>3 – 4 | No substantial modification of colour perception | For use with high pressure mercury vapour lamps and ultra-violet sources (for example, ultra-violet ray treatment, especially when carried out by the patients themselves) |
| 3 – 5 | No substantial modification of colour perception | For use with ultra-violet sources which also emit a high proportion of visible light (for example, very high pressure mercury vapour lamps used in laboratories and medical treatment) |