

ILFORD HOLOGRAPHIC FILM

TYPE SP672

The type SP672 emulsion is an ultrafine grain emulsion with extremely low scatter characteristics designed and sensitised to enable holograms to be recorded by any laser operating in the blue and green regions of the visible spectrum below 550nm, especially the argon ion and frequency doubled neodymium YAG lasers. The optical density has been kept low so that suitable object to reference beam ratios can be achieved for Denisjuk - type holographic recording.

The intrinsic scatter of the unexposed emulsion is sufficiently low to enable it to meet the demanding resolution requirements for Lippman - Bragg recording even in the blue spectral region. This same low scatter means that diffraction efficiencies comparable to dichromated gelatin can be achieved through higher fringe definition, and this, coupled with low post-processing scatter yields exceptionally high signal to noise ratios in the final diffraction grating. To facilitate the manufacture of such reflection holograms, the emulsion is coated on a thick triacetate base to eliminate the problems of bi-refringence in the substrate. The emulsion layer is 7 microns thick.

For those who prefer the chemical inertness and dimensional stability of polyester, the emulsion is available on that substrate also.

Principal areas of application:-

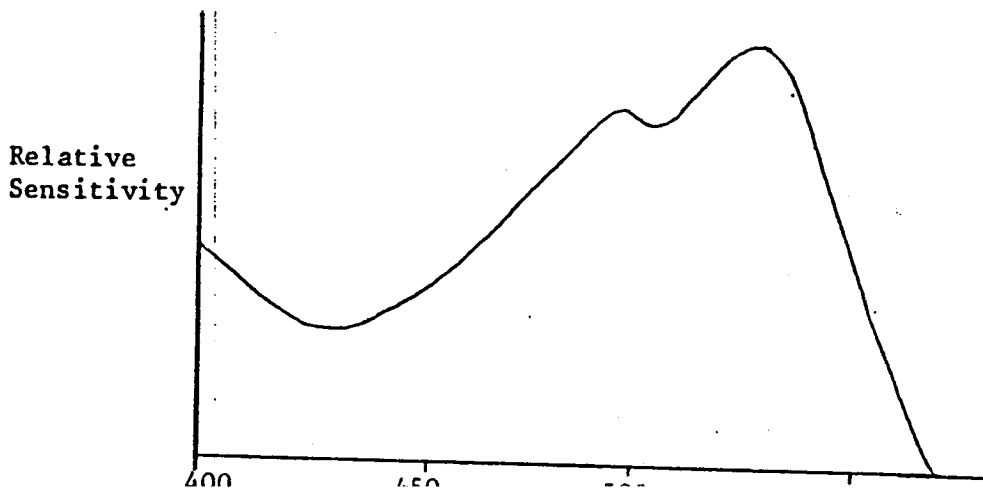
- i. Transmission and reflection display holograms
- ii. Mastering for embossing
- iii. Holographic optical elements

The technical information given below is provisional and will be expanded as more data becomes available. It is intended to be used as guidelines only for those beginning experimental work with this material.

1. Sensitivity

Figure 1 indicates the energy required at each of the major wavelengths of the Ar<sup>+</sup> laser to produce a density of 1 when processed according to the scheme indicated in Appendix 1. The dotted envelope indicates the general shape of the spectral sensitivity with a maximum at 530nm.

Fig 1.



The energies required to produce a density of 1.0 when processed for 1 minute at 20°C in an active metal/hydroquinone developer (Ilford ID19) are :-

5.8 $\mu$ J cm <sup>-2</sup>	---	514nm
131.8 $\mu$ J cm <sup>-2</sup>	---	501.7nm
114.8 $\mu$ J cm <sup>-2</sup>	---	496.5nm
107.2 $\mu$ J cm <sup>-2</sup>	---	488nm
125.9 $\mu$ J cm <sup>-2</sup>	---	476.5nm
199.5 $\mu$ J cm <sup>-2</sup>	---	457.9nm

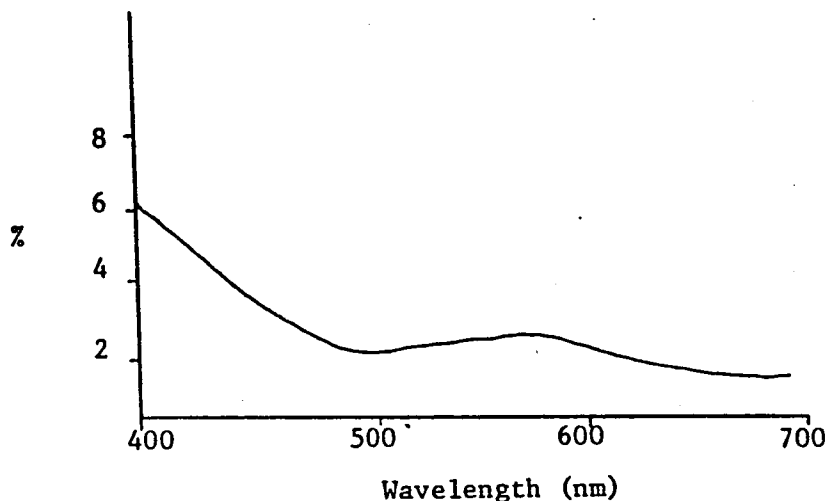
2. Resolution

Greater than 6000 line pairs per millimeter as indicated by the recording of a Lippman - Bragg hologram at 457.9nm.

3. Scatter

Figure 2 shows the ratio of scattered light to specularly transmitted light for the unexposed emulsion throughout the visible spectrum. The method of measurement is given in Appendix 2.

Fig 2.



4. Diffraction efficiency

The theoretical limit of diffraction efficiency for silver halide based recording materials is currently unknown but practically achievable values with SP672 are believed to be limited by recording and processing techniques rather than the emulsion itself. The data presented below were obtained using the techniques given in Appendix 3.

5. Safelights

SP672 can be handled using the Ilford 906 red safelight filter.

6. Processing

In general it can be said that the traditional brown stain of pyrogallol is unnecessary since there will be little scatter requiring to be marked. For more detailed recommendations see separate sheet.

Appendix 1 : Processing for sensitivity measurements

Appendix 2 : Method for scatter measurement on unexposed film

Appendix 3 : Method for measurement of diffraction efficiency