

# The Phase Shift Test Slide Interpretation

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Phase Shift Test Slides are certified by the UK Health and Safety Laboratory according to the visibility of the blocks of lines. The Mark II test slides have been replaced by Mark III slides in three different types. This has resulted in confusion in applying the requirements outlined in the OSHA asbestos regulations 29 CFR 1910.1001, 29 CFR 1926.1101, and 29CFR 1915.1001, and in NIOSH Method 7400. This guidance is given to provide clarification for this rule in this instance. Nothing herein should be considered as rulemaking or imposing additional requirements to employers.

In 1986, when the test slide was first required, there was only one type of slide available, the Mark II. Currently, the Mark III is available in three types, each with differing sets of lines visible under the same viewing conditions. The color of the printing on the slide and the color of the accompanying certificate designate the type of the slide. Slides bearing the Red certification show the fewest sets of lines, the Green certification show more and the Yellow certification show the most set of lines under the same phase-contrast conditions at 500X magnification.

The pertinent requirement in the Mandatory Appendix A of each of the OSHA Asbestos Regulations reads:

10. The phase-shift detection limit of the microscope shall be about 3 degrees measured using the HSE phase shift test slide as outlined below.
  - a. Place the test slide on the microscope stage and center it under the phase objective.
  - b. Bring the blocks of grooved lines into focus.

NOTE: The slide consists of seven sets of grooved lines (ca. 20 grooves to each block) in descending order of visibility from sets 1 to 7, seven being the least visible. The requirements for asbestos counting are that the microscope optics

must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope that fails to meet these requirements has either too low or too high a resolution to be used for asbestos counting.

The NIOSH Method 7400 contains similar language.

The confusion arises in the "NOTE" section of Appendix A because it refers to specific sets of lines that should be visible. With the currently available Mark III slides, the particular line sets visible are different for each color certification.

OSHA and NIOSH investigated the three available grades and compared the slides against the instructions given for each and the requirements of Appendix A. The Salt Lake Technical Center used the same microscopes and analyst in this as were used to evaluate the slides for the 1986 rule. In addition, both agencies had multiple



analysts examine and evaluate the three slides as well as historic slides on hand.

Slides with a red certificate most closely match the description in the NOTE having line sets 6 and 7 invisible. The Green certified slide has line set 7 invisible, which meets the test slide description in the World Health Organization (WHO) method that is standard in Europe. The Yellow certified slide does not have an invisible set.

The requirement of Appendix A is to assure that fiber visibility is the same for all microscopes used to make OSHA assessments. The Appendix gives a phase shift requirement of “about 3 degrees.” The rest of the entry describes how to use the Mark II slide to assess the microscope performance.

This requirement is best met by either the Red or the Green Mark III certified slides because they both have at least one line set that is invisible, allowing the 3 degree benchmark to be bracketed. The Yellow

certified slide does not have an invisible line set in a properly working microscope and thus, cannot assure that the microscope has the proper degree of phase shift.

OSHA and NIOSH recommend that either the Red or the Green Mark III certified slides may be used, as long as they perform within the limits given in the accompanying documentation. The Yellow certified slides should not be used. Should a future technology or product become available for the purpose of assessing phase-shift, it should be acceptable to the extent that it could bracket or measure the phase shift of a microscope to assure that it is operating at about 3 degrees of phase shift.

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