AEROSPACE INFORMATION REPORT

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(R) Ultraviolet (UV) Laser Marking Performance of Aerospace Wire Constructions

RATIONALE

The widespread use of the ultraviolet (UV) laser wire marking process for aerospace wire and cable identification is likely to lead to marking activities considering the use of this process for legacy wire types. This report provides information on updated results that have been achieved utilizing the newest generation of scanning UV laser wire markers to supplement the previous results from mask based laser wire markers during a test program intended to develop information for this purpose.

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1. SCOPE

The purpose of this report is to provide information on the results of ultraviolet (UV) laser marking and mark contrast measurement of a wide range of aerospace wire and cable constructions, the specifications for most of which do not state specific requirements for laser markability. The contents of this document are for information and guidance only. It is not intended that it be used as the basis for marking process specifications or standards, which are covered by AS5649.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AIR5468 Ultraviolet (UV) Lasers for Aerospace Wire Marking

ARP5607 Legibility of Print on Aerospace Wires and Cables

AS4373 Test Methods for Insulated Electric Wire

AS5649 Wire and Cable Marking Process, UV Laser

AS50881 Wiring Aerospace Vehicle

2.2 Definitions

For the purpose of this document, the following terms and definitions apply.

CABLE: Electrical cable, unless noted as a fiber optic cable. Two or more insulated conductors, solid or stranded, contained in a common covering, or two or more insulated conductors twisted or molded together without common covering, or one insulated conductor with a metallic covering shield or outer conductor.

CONTRAST: A measurement relating to the difference in luminance of the mark and its associated background according to a precise formula.

EXCIMER: A gas laser deriving its name from the term “excited dimer.” The laser is energized by means of an electrical discharge in a specialized mixture of rare gases and halogens. Excimer lasers are available operating at a number of discrete wavelengths throughout the UV, the most common of which are 193 nm, 248 nm, 308 nm, and 351 nm. The wavelength is dependant only on the gas mix used; 308 nm is commonly used for UV laser wire marking.

FLUENCE: The energy density, measured in joules per square centimeter (J/cm^{-2}) of a single pulse of the laser beam, which for the purposes of this standard is at the surface of the wire insulation or cable jacket.

INFRARED (IR): Electromagnetic radiation in the wavelength range from approximately 700 nm to in excess of 10000 nm.

INSULATION: For the purposes of this standard, the outer polymer covering of an electrical wire or multi-conductor cable or fiber optic cable.