Australian Government
Civil Aviation Safety Authority

AIRWORTHINESS BULLETIN

Hot Stamping Wire Identification

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1. Applicability

All aircraft

2. Purpose

This topic addresses the use of Hot Stamping for the purpose of wire marking and to encourage the conversion to non-impact marking processes to minimise the damage caused to wire insulation.

3. Background

Hot Stamping

Hot stamp marking of electrical wiring to aid in circuit identification was introduced in the 1940s and was a process well matched to the characteristics of the insulation of the time. Since this time weight considerations and additional electrically powered equipment has resulted in insulation becoming markedly thinner and more susceptible to damage.

This method of marking is by the use of an electric heat pressure marker to burn an identification code on a wire's insulation. It uses a heated typeface to transfer pigment from a ribbon or foil to the surfaces of wires or cables.

Hot stamp marking is suitable, under certain conditions and limitations as specified by the aircraft manufacturer for aircraft wiring.

Wire Marking

Hot stamp marking directly on to the insulation of aircraft electrical wire and cable is not recommended due to the degradation that may be caused to the insulation and because alternate, improved identification methods are available. Fractures of the insulation wall and penetration to the conductor of these materials by the stamping dies have occurred. Serious arcing and surface tracking have damaged wire bundles when these openings have been wetted by various fluids. Figure1 shows the damage that can occur if hot stamping is used to identify wires.

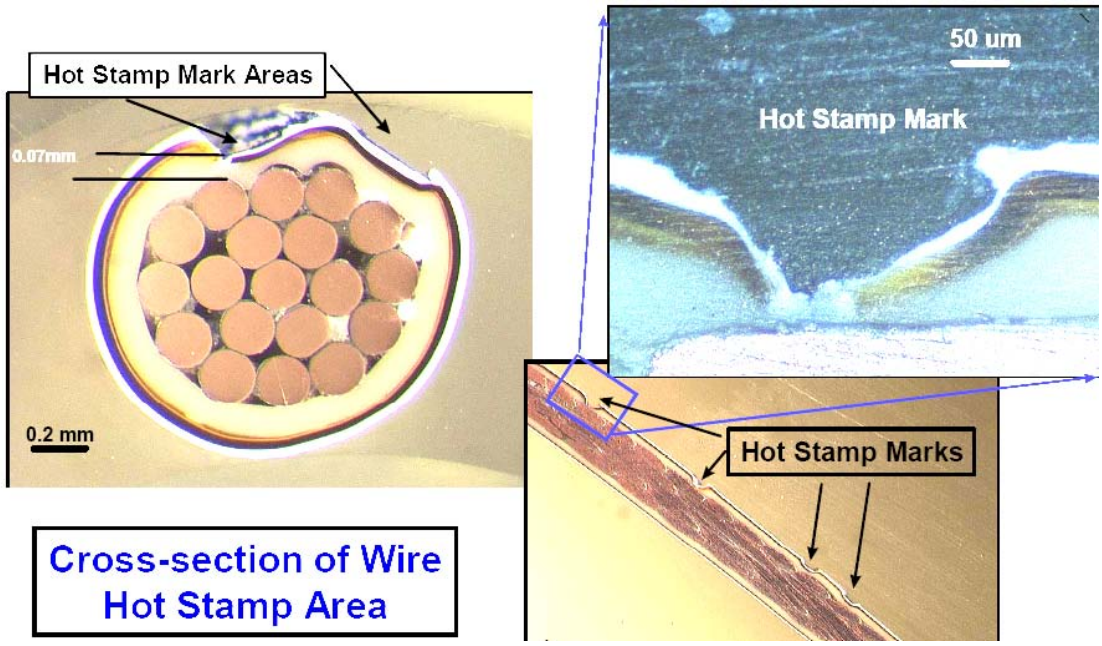

Figure 1

Hot stamp marking should only be used for insulation thickness of greater than 0.01" and will mark wire from 0.038" to 0.25" outside diameter. This process may change the characteristics and integrity of the wire insulation as such it is important to verify the wire insulation has maintained its integrity. SAE ARP 5369 or equivalent standard provides guidance on how to test wire after it has been marked that will ensure the wire maintains its type design. These tests typically require 100% testing of the wire usually with an immersion bath process. Following this process wire should be cleaned to remove any contaminants.

Note: CAR 1988 Reg 42V requires that any maintenance on an aircraft be carried out in accordance with approved data. CAR 2(2A) expands this to include any aircraft component or aircraft material. CAR 2A defines the meaning of maintenance as: in part "the doing of any work (including a modification or repair) on the aircraft component or aircraft material that may affect its soundness or correct functioning.

4. Recommendation

Hot stamp marking of wire and electrical/optical cable should not be used. Coaxial cable should not be hot stamped under any circumstances. The marking pressure and stress (tension and torsion) applied to the cable can create electrical changes in cables and physical damage in miniature cables.

Alternative methods that do not deform wire or cable insulation, such as Ink Jet, Dot Matrix or UV Laser marking should be used as a means of minimising the possibility of damage to the insulation when wire marking.

Marking ribbons/foils have a definite shelf life and ribbons or foils that have exceeded the shelf life should not be used.

5. Enquiries

Enquiries with regard to the content of this Airworthiness Bulletin should be made via the direct link e-mail address: AirworthinessBulletin@casa.gov.au

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