



INTRODUCTION

Using custom test fixtures, precision DC high-voltage power supplies, voltmeters and microammeters, 360° Test Labs performed hi-pot (spark) testing upon a spool of copperweld wire (copper-plated hard-drawn steel wire) consisting of three lengths soldered one to another. The individual wire lengths were about 669 feet, 732 feet and 1330 feet long. The wire has an insulation similar to that found on “magnet wire”, and the purpose of the hi-pot tests was to confirm the wire insulation would withstand 1000 volts DC.

Inspection

As received, the wire appeared to have imperfections throughout its length, highlighted within the red ovals in the following image. In addition to the visible marks, the insulation coverage of the wire felt rough to the touch. The original spool of wire is seen to the left, while the right spool holds wire that has been rewound onto a provided extra spool during the hi-potting tests.



Results

Using a custom-built spool-to-spool winding test fixture, a metallic brush assembly at 1,000 volts DC was allowed to brush against the surface of the wire while a microammeter measured leakage current. Current was limited to 110 microamperes maximum to prevent catastrophic damage to the wire in the event of a high voltage breakthrough. In order to obtain continuous contact with the wire, one end of the wire was threaded through a hole in the spool then clamped under a large steel washer over a threaded rod used as a spindle to allow the wire to unwind one from one spool and onto the other spool. This end of the wire was then grounded. The leftmost red oval in the second image below shows the wire being threaded through the hole in the spool.

The wire insulation proved to survive 1,000 volts DC throughout the length of the insulated wire, other than at the exposed ends. The exposed ends of the three lengths of insulated wire had been soldered together, as seen highlighted to the right in the second image below.

