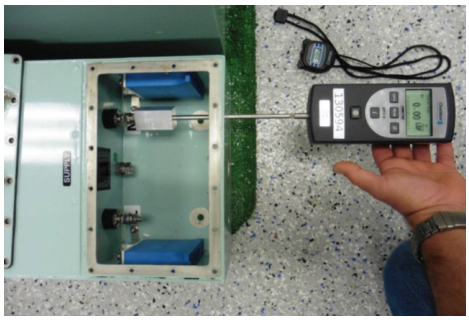
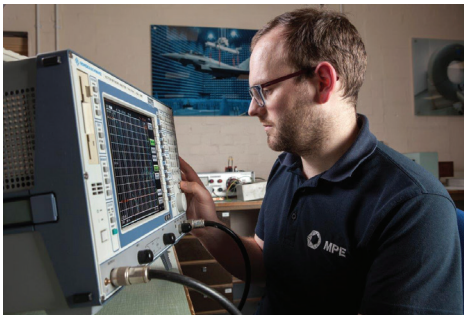
MPE
Quality, Reliability, Performance

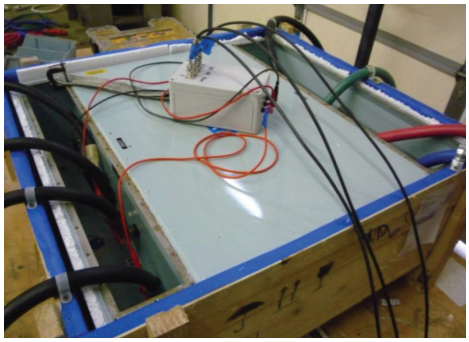
Company Bulletin
for EMC, EMP & TEMPEST Protection
Issue 15



Terminal pull test set-up at Intertek, Michigan



Insertion loss testing at MPE, Liverpool



MPE filter during harmonic distortion testing at DeTech, Virginia

US Army Corps of Engineers (USACE) compliance

As one of the primary HEMP filter suppliers for US defence applications, MPE is often requested to provide evidence of compliance with the United States Army Corps of Engineers (USACE) filter test specification, section 13 27 54.01 10, filter section 2.5, paragraph 2.5.5, as well as the United States Department of Defense (DoD) Unified Facilities Guide Specification (UFGS) 13.49.20.00 10, filter section 2.7, paragraph 2.7.5.

Previously MPE has demonstrated such compliance via individual test reports, in combination with historical supply information. Whilst this has been wholly acceptable for the vast majority of applications, it is often not the most efficient or succinct method of communicating compliance.

During the last quarter of 2017 Technical Sales Solutions (TSS), MPE's Gold Certified Partner for the USA, spearheaded the testing of MPE's HEMP filter solutions in accordance with these USACE and UFGS requirements. This has resulted in a single report providing all required USACE and UFGS compliance information.

Both MPE's standard performance and extended performance HEMP filters were tested, with the tests being conducted by Directed Energy Technologies (DeTech) in Virginia, Intertek Testing Laboratories in Michigan and MPE in Liverpool.

The USACE and UFGS specifications stipulate that tests be conducted on specific terminal strength; insertion loss; voltage drop; current overload; reactive shunt current; dielectric withstand voltage; insulation resistance; harmonic distortion; and filter life. These tests were completed in their entirety for the MPE filters.

As the majority of the required tests have well defined test methodologies and are often requested of MPE, unsurprisingly the test results proved that the MPE filters exceeded all electrical performance requirements and showed no signs of damage or degradation following the mechanical tests.

A less common test requirement is total harmonic distortion (THD), although the test method and maximum permitted THD levels are again well defined within IEEE 519-0-2014; IEC 61000-4-7; UFGS 26-35.46.00 20; and UFGS 13.27.54.00 10. The most stringent of these standards allows a maximum THD threshold of 2.5%. Test results showed that the THD of the MPE filters fell well within this threshold, at a maximum of 0.5% THD.

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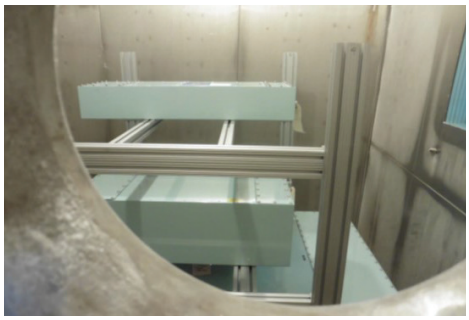

MPE filters undergoing thermal shock testing at Intertek, Michigan

MPE filter during current overload testing at MPE, Liverpool

MPE filters mounted to shield for shield effectiveness testing at DeTech, Virginia

As per the requirements of USACE and UFGS, thermal shock testing was also conducted. The MPE filters were subjected to ten cycles of testing at four different temperatures ranging from -55˚C and +85˚C, with filters being exposed to each temperature for at least eight hours. Following this extensive testing, the filters were again electrically tested and found to be compliant with the stipulations of USACE and UFGS.

Insertion loss testing at 20%, 50% and 100% of rated load is also required by both the USACE and UFGS specifications, in order to validate that the filters do not saturate under load conditions. This testing under load was conducted by DeTech from 14kHz to 3GHz. In all cases the MPE filters were not only compliant but each showed an additional safety margin, in some cases up to 20dB.

As permitted in the USACE and UFGS specifications, the final test requirement, filter life test, was satisfied via provision of a list of prior installations, where MPE HEMP filters have been operational and in service for over five years. This was reinforced by the additional provision of a 24-hour temperature rise test conducted on MPE's 1200A high-current HEMP filter. This report demonstrated clearly that, at 200% load current (2400A), the temperature rise of the MPE filter was insignificant, at less than 0.3˚C.

In addition to this laboratory testing, further shielding effectiveness measurements were provided for MPE's 1200A filters installed under operational load conditions. These measurements showed that the MPE filters exceeded all specification requirements by some margin.

Although originally formulated for, and used primarily in, US defence applications, the USACE and UFGS specifications are also in some cases adopted by project authorities in other territories as their benchmark performance specifications. The proven full compliance of MPE filters with these specifications is therefore a major benefit to any integrator or authority requiring documented evidence of such compliance.

The full test report is available via controlled release. Any request for a copy should be directed either to Terry Murch at Technical Sales Solutions terry@techsalesolutions.com or to Paul Currie at MPE pcurrie@mpe.co.uk

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