



IEC 61000-4-6 Edition 4 Changes Introduced

Introduction

The 4th Edition of IEC 61000-4-6 is scheduled for release summer of 2013. IEC has added new calibration requirements that require new and modified calibration hardware. Edition 4 makes some existing Edition 3 hardware obsolete. This paper describes key changes in Edition 4 of which implementers of IEC 61000-4-6 should be aware.

Key Calibration Changes in the 4th Edition

Current Clamp

Section 6.2.3.1 – 6.2.3.2 is a new requirement that states “... the increase of the transmission loss of the test jig, produced by the insertion of the Current Clamp, shall not exceed 1.6 dB”. This 1.6 dB requirement is verified by subtracting the insertion loss of the calibration fixture without the Clamp in place from the fixture insertion loss with the Clamp in place.

Many of our customers use our Bulk Current Injection Probes (Current Clamps) beyond the IEC-specified 80 MHz. Fischer has designed the FCC-BCICF-6-150 Bulk Current Probe Calibration Fixture to work with our most efficient Current Clamp (FCC-120-9A) up to 230 MHz with an insertion loss less than 1.6 dB.

EM Clamp

Coupling Factor

Previously, the Coupling Factor calibration of the EM Clamp (EM Injection Clamp) was performed in a 150 Ω calibration fixture using a wire laying on the bottom surface of the EM Clamp (wire was not centered in the EM Clamp aperture). While this basic calibration is still required, three changes to the calibration fixture have been added to Edition 4, section A.2.1. The first requires that the dimensions of the reference plane (both vertical and horizontal plates) be 100 mm x 100 mm. The second sets the distance allowed between the vertical reference plane and the edge of the 1st core inside the EM Clamp at 30 mm. The third requires the calibration fixture ground plane to exceed “...the projected geometry of the setup on all sides by at least 0.2 m”.



To meet the first and second requirements, Fischer has redesigned the 150 Ω calibration fixture with the required reference plane size and redesigned the coaxial fittings. Regarding the third requirement, the ground plane for our basic calibration fixture has not changed (32 in x 12 in or 813 mm x 305 mm). If this calibration fixture is used on top of a larger ground plane, the 0.2m requirement is satisfied. Fischer does offer an optional larger ground plane (48 in x 24 in or 1219 mm x 610 mm) which is sufficiently large to directly meet the third requirement without needing an external larger ground plane.

Impedance

Edition 4 adds an impedance calibration requirement using a 50 Ω system. The impedance calibration requires a metallic rod passing through the EM Clamp aperture be centered in the aperture. To meet this requirement, Fischer has developed a new set of reference plane calibration fixtures that meet the 50 Ω requirement as well as the dimensional and spacing requirements cited above for the Coupling Factor.

Edition 4 specifies that the Impedance measured in this 50 Ω system be mathematically transformed to correct for the height of the rod passing through the EM Clamp aperture, which is different from that which would be used in a classical 50 Ω system.

Decoupling

Edition 4 requires this calibration to be performed in the same 50 Ω system as the Impedance calibration. The results of this Decoupling calibration also need to be mathematically transformed as described above.

Decoupling Clamp

Impedance

Edition 4 adds an impedance calibration requirement using a 50 Ω system and specifies that the Impedance measured in this 50 Ω system be mathematically transformed to correct for the height of the rod passing through the EM Clamp aperture, which is different from that which would be used in a classical 50 Ω system.

Decoupling

Edition 4 requires this calibration to be performed in the same 50 Ω system as the Impedance calibration. The results of this Decoupling calibration also need to be mathematically transformed as described above.

Obsolete Hardware

Due to the new Edition 4 limitation cited above on the distance between the vertical reference plane of the calibration fixture and the 1st core inside the EM Clamp, the Fischer Model F-203I-23mm and -32mm are now obsolete.



Hardware Summary

Table 1 lists Fischer products designed to meet Edition 3 and corresponding Edition 4 Fischer products.

| Description | Edition 3 Part Number | Edition 4 Part Number |
|--|--------------------------|-----------------------|
| EM Injection Clamp 23mm aperture 10 kHz - 1000 MHz | F-203I-23mm ¹ | F-203I-A-23mm |
| 23mm Calibration Fixture 150 Ω version 10 kHz – 230 MHz | F-203I-CF1-23mm1 | F-203I-A-CF1-23mm-150 |
| 23mm Calibration Fixture 150 Ω version 10 kHz – 1000 MHz | F-203I-CF3-23mm1 | F-203I-A-CF3-23mm |
| 23mm Calibration Fixture 50 Ω version 10 kHz – 1000 MHz | None ² | F-203I-A-CF3-23mm-50 |
| 32mm EM Injection Clamp 10 kHz – 1000 MHz | F-203I-32mm1 | F-203I-A-32mm |
| 32mm Calibration Fixture 150 Ω version 10 kHz – 230 MHz | F-203I-CF1-32mm1 | F-203I-A-CF1-32mm-150 |
| 32mm Calibration Fixture 150 Ω version 10 kHz – 1000 MHz | F-203I-CF3-32mm1 | F-203I-A-CF3-32mm-150 |
| 32mm Calibration Fixture 50 Ω version 10 kHz – 1000 MHz | None ² | F-203I-A-CF3-32mm-50 |

Table 1 – IEC 61000-4-6 Edition 3 and 4 Hardware

¹ Obsolete

² Not Required for Edition 3