CE Compliance and Beyond

VIATRAN

CE stands for “Conformite Europeenne” or European Conformity. CE Compliance means that the product meets all of the applicable European Union (EU) Directives. These requirements govern the compliance of devices sold on the European market. There are various CE regulations and some are mandatory only when the device is placed in a specific environment. For transducers, CE compliance always requires electromagnetic compatibility or EMC testing.

Electromagnetic Interference (EMI) is electrical energy in the wrong place at the wrong time. This unwanted electrical energy is present everywhere and can cause unintended and unpredictable responses in electronic equipment. Electronic devices have the potential to be a source of, or receptor for, this unwanted interference or “noise”.

Walkie-Talkies, which are used extensively within industrial manufacturing and processing environments, are an example of devices that can create excessive amounts of EMI. They generate powerful signals that can cause false readings on nearby instrumentation. Pressure transducers are extremely susceptible to the effects of this interference. Their circuitry amplifies the low-level sensor signal along with any unwanted noise. There are many other sources of EMI, including cell phones, wireless transmitters, motors, generators, power line disturbances, and lighting, to name a few.

To better understand and minimize the effects of electromagnetic interference, instrument manufacturers perform EMI testing, which mimics the environment a piece of equipment would be placed in. This testing confirms the electromagnetic compatibility (EMC) of a device (i.e. the ability to perform its intended function in an environment where EMI is present).

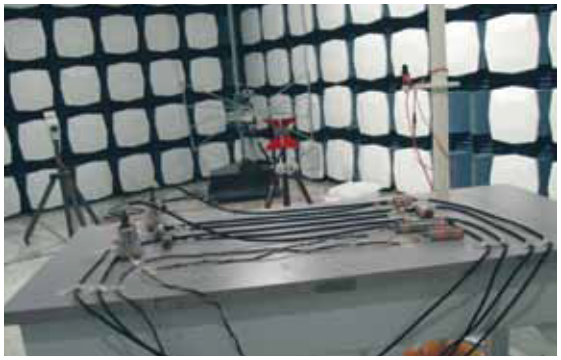
CE EMC Requirements

Testing of an electronic device in the simulated environment allows for the development of a more reliable and robust product. Various standards and regulations exist throughout the world. Some of these regulations are voluntary and some require mandatory compliance.

The testing required to meet the CE EMC standard depends on the type of device being tested and its intended environment. According to the EN 61326 standard, transducers used for the measurement of pressure must undergo specific tests to ascertain their immunity to noise typically encountered by this category of electronics. Depending on their circuitry, it may also be necessary to test emissions to confirm their environmental compatibility. EMC Immunity testing may include:

- Radiated Immunity (from EMI generated by nearby devices and equipment)
- Conducted Immunity (to disturbances on power lines)
- Surges (transient high voltage which could be caused by nearby lightning and other phenomena)
- Bursts (fast, repetitive, low-energy electrical transients that could be caused by the cycling of relays and other equipment)
- Electrostatic Discharges (ESD)

With all of these tests, except for surge, the standard limits the allowable deviation. This limit is based on the accuracy the manufacturer specifies on the product. Surges are a special case. There is no deviation limit specified for a device during the surge test. The device passes the test if it returns to a valid output.



Photograph courtesy of Parker-Chomerics Test Services.

CE EMC Testing

Some companies send their designs to third party certification laboratories for testing and receive pass/fail reports. Viatran typically takes the new designs to a third party facility for EMC testing. A Viatran design engineer takes the new design along with a broad array of resistors, capacitors and tools. This way they can make CE compliance circuitry modifications and test them on the spot.

The facility has the required test equipment to perform the EMC tests. This includes an anechoic chamber. The chamber is used during radiated immunity testing to minimizes external sources of EMI. During radiated immunity testing, the pressure transducer is set up in the chamber and monitored by test equipment that is outside the anechoic chamber. The transducers are subjected to EMI at various frequencies and multiple directions while the results are recorded and monitored.

Transducers may be very sensitive to EMI at some frequencies and not very sensitive at others. For radiated immunity testing, frequencies from 80MHz to 2.7GHz are scanned. During this test, the unit is monitored to expose those frequencies the transducer is most susceptible to. Circuit modifications can be made to optimize circuit performance. When these changes are completed, Viatran will scan through the entire range one more time to make sure the response is good at all frequencies.

Based on numerous hours spent at the test facility, Viatran knows how to design circuits that minimize the effects of the EMI. For example, printed circuit board layout is critical. Circuitry designed to filter out EMI should be placed as close to the connector as possible. Design engineers are careful to create as much distance as possible between CE EMC filtering circuitry and sensitive sensor signal conditioning circuitry within the transducer. In addition, sensitive circuitry is shielded from this filtering circuitry by a ground plane.

Viatran will sometimes take in several units with different configurations, compare their performance and determine the most noise hardened design. In addition, to ensure a superior product, Viatran may test transducers beyond the required CE EMC specifications. Viatran has learned a lot over the years and accumulated a knowledge base that is very helpful.

Even Better EMI Attenuation

Most of Viatran's transducer designs and all of those introduced since 2006 are CE EMC certified. This provides a high level of confidence that these pressure sensors will perform as specified in environments where EMI is a concern.

An example of such an environment is deep well oil drilling where pressure readings are used for directional control of drill bits thousands of feet below the surface. These signals are often very weak and could easily be degraded by the many electrical motors and Walkie Talkies present at an oil drilling site. In cases like these, users can specify EMC to even higher standards than those required for CE. These specifications can be met by using specially designed transducers or modifying existing models to incorporate additional EMI filtering.

Photograph courtesy of Parker-Chomerics Test Services.

These users should pay careful attention to make sure the transducer is installed with a good, solid case ground. As a rule of thumb, shielded cables should be grounded at either the data acquisition end or transducer end of the cable to avoid the possibility of creating ground loops. The optimal grounding configuration depends on a variety of factors present within the environment and application installation.

It helps to understand the typical sources of EMI in a particular application environment. It may be possible to minimize the effects of these EMI generators by modifying the equipment or locating it away from critical pressure sensors.

The application specialists at Viatran have years of field and laboratory experience with transducers used in EMI environments. They should be approached early on for advice.

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